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FINAL

SAMPLE STRATEGY PLAN

REMEDIAL INVESTIGATION/ FEASIBILITY STUDY PROJECT PLANS

OPERABLE UNIT NO. 6
(SITES 36, 43, 44, 54, and 86)
MARINE CORPS BASE,
CAMP LEJEUNE, NORTH CAROLINA

CONTRACT TASK ORDER 0246

APRIL 22, 1994

Prepared for:

DEPARTMENT OF THE NAVY
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ENGINEERING COMMAND
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TABLE OF CONTENTS

Page

INTRODUCTION v

1.0 OPERABLE UNIT NO. 6, SITE 36, CAMP GEIGER AREA PUMP NEAR SEWAGE TREATMENT PLANT 1-1
1.1 Site Location and Setting 1-1
1.2 Site History 1-1
1.2.1 Summary of Previous Investigations 1-1
1.3 Site Observations 1-2
1.4 Proposed Sampling Investigation 1-3

2.0 OPERABLE UNIT NO. 6, SITE 43, AGAN STREET DUMP 2-1
2.1 Site Location and Setting 2-1
2.2 Site History 2-1
2.2.1 Summary of Previous Site Investigations 2-1
2.2.2 Study Findings 2-2
2.3 Site Observations 2-3
2.4 Proposed Sampling Investigation 2-4

3.0 OPERABLE UNIT NO. 6, SITE 44, JONES STREET DUMP 3-1
3.1 Site Location and Setting 3-1
3.2 Site History 3-1
3.2.1 Summary of Previous Site Investigations 3-1
3.2.2 Study Findings 3-2
3.3 Site Observations 3-2
3.4 Proposed Sampling Investigation 3-3

4.0 OPERABLE UNIT NO. 6, SITE 54, CRASH CREW FIRE TRAINING BURN PIT 4-1
4.1 Site Location and Setting 4-1
4.2 Site History 4-1
4.3 Site Observations 4-2
4.4 Proposed Sampling Investigation 4-3

5.0 OPERABLE UNIT NO. 6, SITE 86, TANKS AS419, AS420, AND AS421 5-1
5.1 Site Location and Setting 5-1
5.2 Site History 5-1
5.2.1 Summary of Previous Site Investigations 5-1
5.3 Site Observations 5-2
5.4 Proposed Sampling Investigation 5-3

LIST OF FIGURES

Number

1-1 Operable Unit and Site Locations at Marine Corps Air Station New River
1-2 Previous Investigation Sample Locations and Results - Site 36: Camp Geiger Area Dump Near Sewage Treatment Plant
1-3 Observations - Site 36: Camp Geiger Area Dump Near Sewage Treatment Plant
1-4 Proposed Sample Locations - Site 36: Camp Geiger Area Dump Near Sewage Treatment Plant

2-1 Previous Investigation Sample Locations and Results - Site 43: Agan Street Dump
2-2 Observations - Site 43: Agan Street Dump
2-3 Proposed Sample Locations - Site 43: Agan Street Dump

3-1 Previous Investigation Sample Locations and Results - Site 44: Jones Street Dump
3-2 Observations - Site 44: Jones Street Dump
3-3 Proposed Sample Locations - Site 44: Jones Street Dump

4-1 Previous Investigation Sample Locations and Results - Site 54: Crash Crew Fire Training Burn Pit
4-2 Observations - Site 54: Crash Crew Fire Training Burn Pit
4-3 Proposed Sample Locations - Site 54: Crash Crew Fire Training Burn Pit

5-1 Previous Investigation Sample Locations and Results - Site 86: Tank Area AS419 - AS421 at Marine Corps Air Station
5-2 Observations - Site 86: Tank Area AS419 - AS421 at Marine Corps Air Station
5-3 Proposed Sample Locations - Site 86: Tank Area AS419 - AS421 at Marine Corps Air Station

LIST OF TABLES

Number

1-1 Groundwater Analytical Results - Site 36: Site Summary Report, 1990
1-2 Sediment Analytical Results - Site 36: Site Summary Report, 1990

2-1 Soil Analytical Results/Comparison to Risk-Based Concentrations - Site 43: Site Inspection, 1991
2-2 Soil Analytical Results/Comparison to Background Concentrations - Site 43: Site Inspection, 1991
2-3 Groundwater Analytical Results - Site 43: Site Inspection, 1991
2-4 Surface Water Analytical Results - Site 43: Site Inspection, 1991
2-5 Sediment Sample Analytical Results - Site 43: Site Inspection, 1991

3-1 Soil Analytical Results/Comparison to Risk-Based Concentrations - Site 44: Site Inspection, 1991
3-2 Soil Analytical Results/Comparison to Background Concentrations - Site 44: Site Inspection, 1991
3-3 Groundwater Analytical Results - Site 44: Site Inspection, 1991
3-4 Surface Water Analytical Results - Site 44: Site Inspection, 1991
3-5 Sediment Sample Analytical Results - Site 44: Site Inspection, 1991

4-1 Groundwater Analytical Results - Site 54: Site Summary Report, 1990
4-2 Sediment Analytical Results - Site 54: Site Summary Report, 1990

5-1 Groundwater Analytical Results - Site 86: Site Summary Report, 1990

INTRODUCTION

OPERABLE UNIT NO. 6

This Final Sample Strategy Plan presents an overview of the Remedial Investigation (RI) scope of work for Site 36 (Camp Geiger Area Dump near the Sewage Treatment Plant), Site 43 (Agan Street Dump), Site 44 (Jones Street Dump), Site 54 (Crash Crew Tire Training Burn Pit) and Site 86 (Tank Area AS419-AS421) at Marine Corps Base (MCB), Camp Lejeune, North Carolina. Figure 1-1 shows the overall locations of these sites.

The purpose of the Final Sample Strategy Plan is to provide the EPA Region IV, the North Carolina Department of the Environment, Health, and Natural Resources (DEHNR), and members of the technical review committee (TRC) with a summary of the proposed field investigations that will be presented by LANTDIV at an upcoming RI/FS scoping meeting. This document is meant to be used as a supplement to the scoping meeting, and is not intended for formal comment. Questions or comments on the proposed RI field investigations will be addressed by LANTDIV at the upcoming meeting.

The format of the Final Sample Strategy Plan is as follows. Each site is addressed separately in this document. A brief description of the site location and setting, site history, a summary of previous investigations and site visit observations are provided. Previously-obtained analytical results are also presented in table format in order to familiarize the reader with the level and types of contamination at the site. The proposed field investigations are described, including the objectives and sampling rationale. Figures depicting the sampling stations are also included.

1.0 OPERABLE UNIT NO. 6, SITE 36, CAMP GEIGER DUMP AREA NEAR SEWAGE TREATMENT PLANT

Information presented in Sections 1.1 and 1.2 was obtained from the ESE Site Summary Report, 1990.

1.1 Site Location and Setting

The Camp Geiger Area Dump (Site 36) is located east of the Camp Geiger Sewage Treatment Plant (STP), downstream of Site 35 on the Marine Corps Air Station (MCAS), New River portion of MCB, Camp Lejeune (see Figure 1-1). The site, identified in previous investigations, is approximately 1.5 acres in size and is heavily wooded and vegetated. Brinson Creek and an unnamed tributary form the northern and southern borders of the site. The New River is approximately one-half mile east of the site. The site's elevation lies between 2 to 15 feet above mean sea level (MSL). Based on an average depth of fill of 15 feet, the estimated volume of the disposal area was 14,000 cubic yards. This estimate is based on map and photographic information only (no field measurements were performed for this purpose).

1.2 Site History

Site 36 was used for the disposal of municipal wastes and mixed industrial wastes including garbage, trash, waste oils, solvents, and hydraulic fluids from the air station from the late 1940s to the late 1950s. Approximately 10,000 to 15,000 gallons of solvents and oils may have been disposed at Site 36. Most of the material was first burned and then buried, however, some unburned material was buried. Disposal records state that all waste solvents and oils were burned at the site (ESE, 1990).

1.2.1 Summary of Previous Investigations

A site investigation (SI) was performed in 1984. Additional investigations of the site occurred in 1986 and 1987. Figure 1-2 presents the locations of the sampling points for all media (groundwater, surface water, and sediments) investigated during the SIs and analytical results.

Groundwater

Five shallow groundwater monitoring wells (20 to 25 feet in depth with 15-foot long screen lengths) were installed at Site 36, four in 1984 and one in 1986. Based on the figure presented in the ESE 1990 report, it appears that the screens on the monitoring wells were installed below the water table. Well 36GW01 was placed on the southern side of the disposal area (disposal area identified on the figure as "Former Dump Area"). Wells 36GW02 and 36GW03 were placed on the east and northeast sides of the disposal area between the disposal area and Brinson Creek. Well 36GW04 was installed as a background well approximately 300 feet to the west (upgradient) of the disposal area. Well 36GW05 was placed to the west of the site as an additional upgradient monitoring point. Depth to groundwater at the site was reported to be five feet. The samples from these monitoring wells were analyzed for the following target compounds:

- Cadmium
- Chromium
- Hexavalent chromium (1986/87 only)
- Lead
- Volatile organics (VOC)
- Oil and grease (O&G)
- Total phenol
- Ethylene dibromide (EDB) (1986/87 only)
- Xylene (1986/87 only)

- Methyl ethyl ketone (MEK) (1986/87 only)
- Methyl isobutyl ketone (MIBK) (1986/87 only)

Cadmium, chromium, lead, and phenols were detected in all four monitoring wells in July 1984. The detected concentrations in all four monitoring wells were similar, including well 36GW04, the upgradient well. Well 36GW04 was the only well that indicated detectable levels of VOCs. The presence of contamination in well 36GW04 suggests that the disposal area extends farther to the west than first thought. Table 1-1 presents the analytical results for groundwater.

These four wells were resampled in December 1986 and an additional well was installed farther west of well 36GW04. The analytical results of the December 1986 sampling effort were relatively consistent with 1984 results. Most detected levels in 1986 were slightly lower relative to the 1984 sampling round. O&G was detected in all wells in 1986, and 1,1,2,2-tetrachloroethane was detected only in well 36GW04. Chromium and O&G were detected in the new upgradient well 36GW05 which was sampled in March 1987.

Surface Water

Four surface water samples were collected in 1986: two from Brinson Creek, one upstream and one downstream, and two from the unnamed creek (one upstream and one downstream). These samples were analyzed for the same target compounds as the groundwater. Detectable levels of trans-1,2-dichloroethane (2.5 μg/L), lead (39 μg/L), and total phenols (4 μg/L) were detected in the unnamed creek upstream sample (36SW03). This small stream passes through the southern portion of the filled area. Lead (33.1 μg/L) was also detected in the upstream sample 36SW01 from Brinson Creek at a concentration which is above the state freshwater standard of 25 μg/L.

Sediment

Four sediment samples were collected in 1986 at the same locations as surface water samples. The sediment sample were analyzed for the following parameters:

- Cadmium
- Lead
- Total Phenols
- Hexavalent Chromium
- Chromium
- O&G
- EDB

Chromium, lead, O&G, and phenols were detected in all four sediment samples. Cadmium was detected in one sample (36SE04). Table 1-2 presents the analytical results for sediment.

1.3 Site Observations

The following provides a brief description of Site 36 field observations which were noted during the site visit from March 16 through 18, 1994. Figure 1-3 depicts the locations of the features noted during the site visit.

- The open field area was littered with piles of tree debris.
- A former berm was identified northeast of the open field area.

- On top of the berm area, the surface is flat and heavily vegetated. No stressed areas were identified.

- The southern portion of the berm is approximately 8 to 15 feet high. The northern extent is between 2 to 6 feet high.

- Buried wire and broken debris (glass, metal) were identified in the middle of the dirt road near the northern portion of the berms area.

- A dismantled former structure was noted in aerial photographs near the edge of Brinson Creek. The structure is gone, but the concrete foundation was noted. General litter was observed throughout.

- A small pile of yellow spiractor sand (i.e., filter sand) was noted along the main access road.

- All five existing monitoring wells were located during the site visit (the location of 36GW01 was inaccurately located on existing figures).

- Another area of concern identified from the aerial photographs was noted to be southwest of the form dump area. During the site visit, a formerly cleared area was identified. It had stressed vegetation. North of this area, a few buried drums were noted along with several mounds of construction debris. Portions of this area were swampy.

- 55-gallon drums and 5-gallon pails were identified south of the area where the unnamed tributary crosses the main access road. The material in the drums could not be identified. However, material in the pails were identified as "alkaline material" and "lubrication oil."

- The site area appears to be larger than originally depicted in previous reports.

1.4 Proposed Sampling Investigation

The following field investigation activities are proposed at Site 36. Sample locations are identified on Figure 1-3.

Soil Borings/Soil Samples

- Formerly Cleared Area: Fifteen surface and subsurface sample locations (including samples collected during the installation of shallow well 36GW07)

- Open Field Area: Seven surface and subsurface sample locations

- Former Dump Area: Six surface and subsurface sample locations (including samples collected during the installation of shallow well 36GW11)

- Drum Disposal Areas: Up to three surface sample locations per area

- Remaining Site Area: Up to eight surface and subsurface sample locations

- Sample Collection From Well Installation: Surface and subsurface samples at selected wells

Soil samples will be analyzed for full Target Compound List (TCL) volatiles, semivolatiles, polychlorinated biphenyls (PCBs), and pesticides, and Target Analyte List (TAL) metals. Samples collected from 18 of the boring locations will be subject to an accelerated (7-day) laboratory turnaround time as shown on Figure 1-4. Note that surface samples will be collected from just below ground surface to 12 inches and subsurface samples will be collected just above the water table. A third sample from each boring may also be submitted for analysis if evidence of contamination (i.e., visual or by monitoring instrument) is noted.

Well Installation/Groundwater Samples

- One shallow/deep monitoring well cluster (36GW06 and 36GW06DW) will be installed upgradient from the site.
- One shallow/deep monitoring well cluster (36GW07 and 36GW07DW) will be installed within the Formerly Cleared Area.
- One shallow monitoring well (36GW08) will be installed downgradient from the Formerly Cleared Area.
- One shallow monitoring well (36GW09) will be installed within the open field.
- One shallow monitoring well (36GW10) will be installed north of the site.
- One shallow/deep monitoring well cluster (36GW11 and 36GW11DW) will be installed within the Former Dump Area.
- A temporary well will be installed at each of the two drum disposal areas.

The shallow monitoring wells will be installed within the surficial aquifer at an estimated depth of 15 to 20 feet below ground surface. The deep monitoring wells (Type III or double-cased wells) will be installed below the semi-confining layer which separates the surficial aquifer and deeper Castle Hayne aquifer. Based on published information obtained from a USGS report for MCB Camp Lejeune, the semi-confining layer is present at a depth between 40 and 60 feet in this area of the Base.

Groundwater samples collected from all existing and newly installed shallow monitoring wells will be analyzed for full TCL organics and total and dissolved TAL metals. Samples collected from the newly installed deep wells will be analyzed for volatiles, semivolatiles, and total and dissolved TAL metals.

Surface Water/Sediment Samples

- Unnamed Tributary to Brinson Creek: Four sample stations
- Brinson Creek: Three sample stations

Surface water and sediment samples will be analyzed for full TCL organics and TAL metals. Note that these samples will be collected in April 1994 as part of the RI being conducted at Site 35 (northwest of Site 36). These samples are being collected in April 1994 to provide data for a regional study of the Brinson Creek watershed.

Fish/Benthic Samples

- Brinson Creek: Three fish/benthic stations

All fish samples (tissue analysis) will be analyzed for full TCL organics and TAL metals. Note that these samples will also be collected in April 1994 during the RI being conducted at Site 35 to provide data for a regional study of the Brinson Creek watershed.

Test Pit Samples

- Three to five shallow test pits (approximately 5-feet in depth and 10-feet long) will be trenched within the Formerly Cleared Area and Former Dump Area. The exact locations of these pits will be determined in the field based on the results of the soil investigation. Further, samples may be collected from each pit for analysis of full TCL organics, total TAL metals, and full toxicity characteristic leachate procedure (TCLP) organics and metals. Samples will be collected only if visual contamination is suspected or if odors are evident.

Potential Time-Critical Removal Action

- Drums identified on the surface will be sampled and possibly removed under a potential Time-Critical Removal Action. Drum samples will be analyzed for full TCL organics, TAL metals, full TCLP, and RCRA hazardous waste characteristics. Following the analysis, the contents of the drums will be evaluated and the drums may be potentially removed from the site. Surface samples (identified under soil sampling) will also be collected around the drum areas.

SECTION 1.0
Tables

TABLE 1-1
GROUNDWATER ANALYTICAL RESULTS
SITE 36 - CAMP GEIGER DUMP AREA NEAR SEWAGE TREATMENT PLANT
SITE SUMMARY REPORT, 1990
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number:	Standards		36GW1	36GW1	36GW1	36GW2	36GW2	36GW2	36GW3
Date Sampled:	NCWQS (1)	MCL (2)	7/31/84	7/31/84	12/9/86	7/31/84	7/31/84	12/9/89	7/31/84
Parameter: Units (ug/L)									
trans-1,2-Dichloroethene	70	100	< 0.7	< 0.7	< 1.6	< 0.7	< 0.7	< 1.6	< 0.7
Methylene Chloride	5	5	< 0.6	< 0.7	< 2.8	< 0.6	< 0.7	< 2.8	< 0.6
1,1,2,2-Tetrachloroethane	--	--	< 0.5	< 0.5	< 4.1	< 0.5	< 0.5	< 4.1	< 0.5
Cadmium	5	5	12	8	3	14	19	4	7
Chromium	50	100	480	510	130	420	680	142	280
Lead	15	15 (3)	324	265	45	249	346	73	104
Phenols	--	--	3	2	4	2	6	7	3
Oil & Grease	--	--	< 900	< 1000	2000	< 900	< 900	2000	< 1000

NOTES:

ug/L - Microgram per liter.

(--) - Standard not available.

Shading indicates that chemical exceeded standard and/or criteria.

(1) NCWQS - North Carolina Water Quality Standards for groundwater.

(2) National Primary Drinking Water Regulations, Primary Maximum Contaminant Levels (MCLs).

(3) The MCL is an Action Level.

Source: ESE, Site Summary Report, Final. September, 1990.

TABLE 1-1
GROUNDWATER ANALYTICAL RESULTS
SITE 36 - CAMP GEIGER DUMP AREA NEAR SEWAGE TREATMENT PLANT
SITE SUMMARY REPORT, 1990
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number:	Standards		36GW3	36GW3	36GW4	36GW4	36GW4	36GW5	36GW5
Date Sampled:	NCWQS (1)	MCL (2)	7/31/84	12/9/86	7/31/84	7/31/84	12/9/86	12/9/86	3/5/87
Parameter: Units (ug/L)									
trans-1,2-Dichloroethene	70	100	< 0.7	< 1.6	2	1.2	< 1.6	< 1.6	< 1.6
Methylene Chloride	5	5	< 0.7	< 2.8	< 0.7	7	< 2.8	< 2.8	< 2.8
1,1,2,2-Tetrachloroethane	--	--	< 0.5	< 4.1	4	3	< 4.1	< 4.1	< 4.1
Cadmium	5	5	NA	< 2.9	9	NA	< 2.9	< 2.9	< 3.5
Chromium	50	100	NA	12	510	NA	103	18.2	51
Lead	15	15 (3)	NA	29	217	NA	< 27	< 27	< 27
Phenols	--	--	3	3	2	1	< 2	< 2	< 2
Oil & Grease	--	--	< 1000	< 1000	< 900	< 900	2000	1000	1000

NOTES:

ug/L - Microgram per liter.

(--) - Standard not available.

Shading indicates that chemical exceeded standard and/or criteria.

(1) NCWQS - North Carolina Water Quality Standards for groundwater.

(2) National Primary Drinking Water Regulations, Primary Maximum Contaminant Levels (MCLs).

(3) The MCL is an Action Level.

Source: ESE, Site Summary Report, Final. September, 1990.

TABLE 1-2
SEDIMENT ANALYTICAL RESULTS
SITE 36 - CAMP GEIGER DUMP AREA NEAR SEWAGE TREATMENT PLANT
SITE SUMMARY REPORT, 1990
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number:	36SE1	36SE2	36SE3	36SE4	NOAA SSV (1)	
Date Sampled:	12/9/86	12/10/86	12/10/86	12/10/86	ER-L (2)	ER-M (3)
Paramenter: Units (mg/kg)						
Cadmium	< 0.879	< 1.94	< 0.59	0.722	5	9
Chromium	8.49	14.2	5.29	5.44	80	145
Lead	77.5	42.5	15.3	10.7	35	110
Oil & Grease	1480	2410	1200	185	--	--
Phenols	2030	1950	1080	464	--	--

Notes:
mg/kg - Milligram per kilogram.
(--) - Value is not available.
Shading indicates that chemical exceeded standard and/or criteria
(1) NOAA SSV - National Oceanic and Atmospheric Administration Sediment Screening Values (USEPA Region IV, 1992).
(2) ER-L - Effects range - low, if contaminant concentrations fall below the ER-L adverse aquatic effects are considered unlikely.
(3) ER-M - Effects range - median, if contaminant concentrations fall above the ER-M adverse aquatic effects are considered probable.
If the value falls between ER-L and ER-M adverse aquatic effects are considered possible.
Source: ESE, Site Summary Report, Final. September, 1990.

SECTION 1.0
Figures

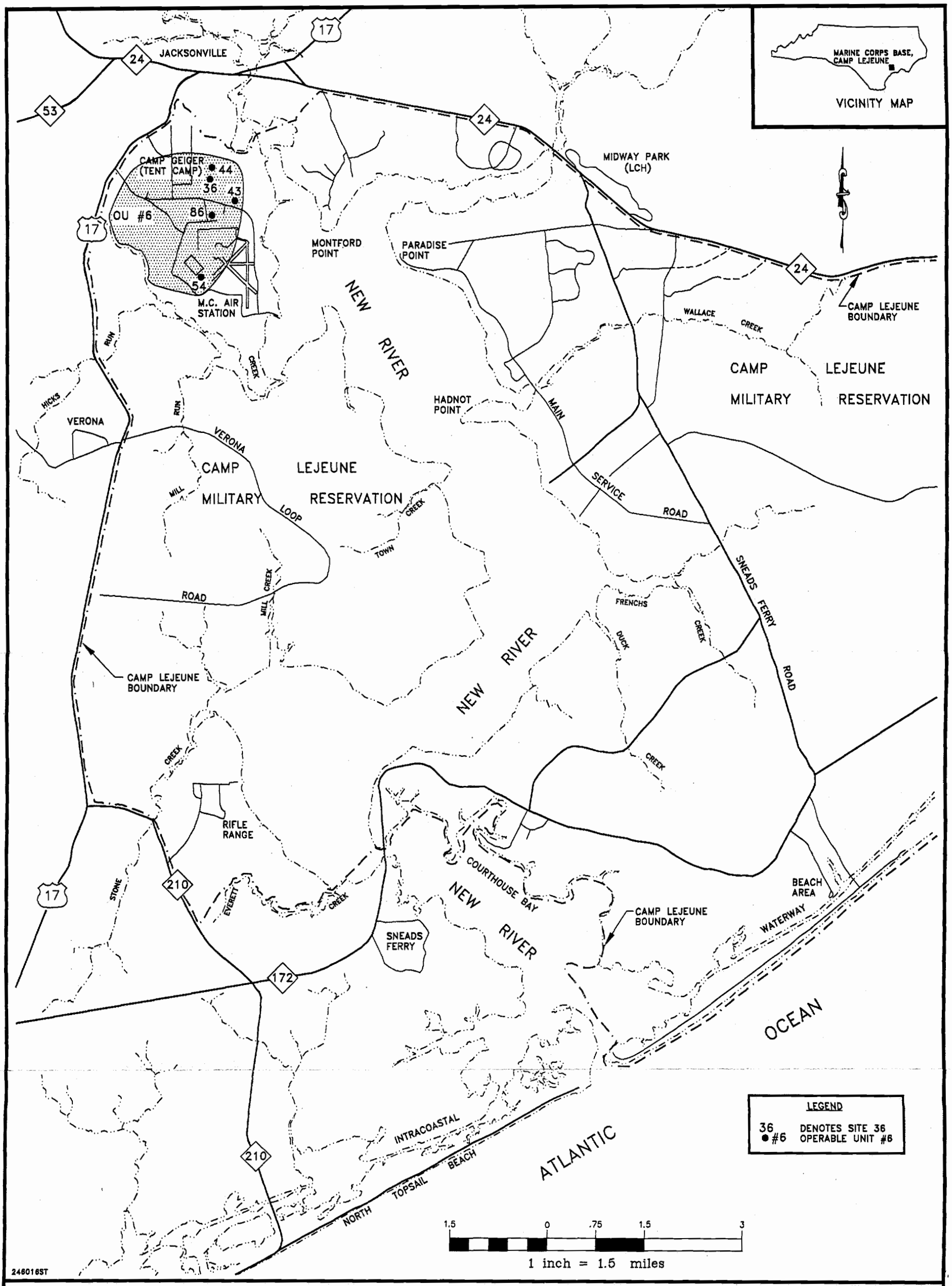
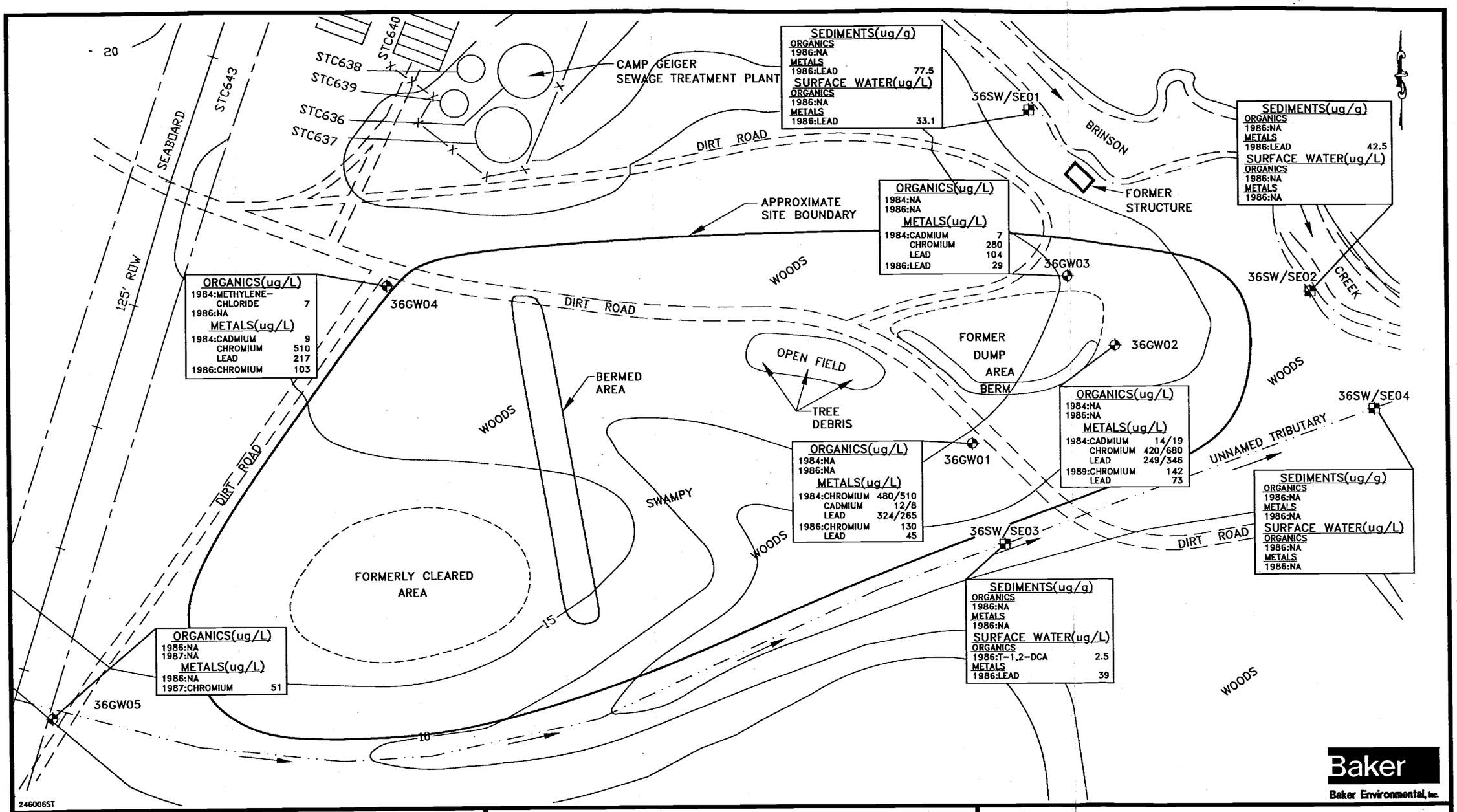


FIGURE 1-1
OPERABLE UNITS AND SITE LOCATIONS AT
MARINE CORPS AIR STATION, NEW RIVER
CTO-0246

MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA

00397M01Z



LEGEND

36GW01 — EXISTING SHALLOW MONITORING WELL LOCATION

36SW/SE01 — PREVIOUS SURFACE WATER/SEDIMENT SAMPLE STATION

NA — NOT APPLICABLE

NOTES:
-ALL RESULTS PRESENTED IN ug/L OR ug/g.
-ONLY THOSE CONCENTRATIONS WHICH EXCEED STATE OR FEDERAL STANDARDS ARE SHOWN.
SOURCE: LANTDIV, FEB. 1992

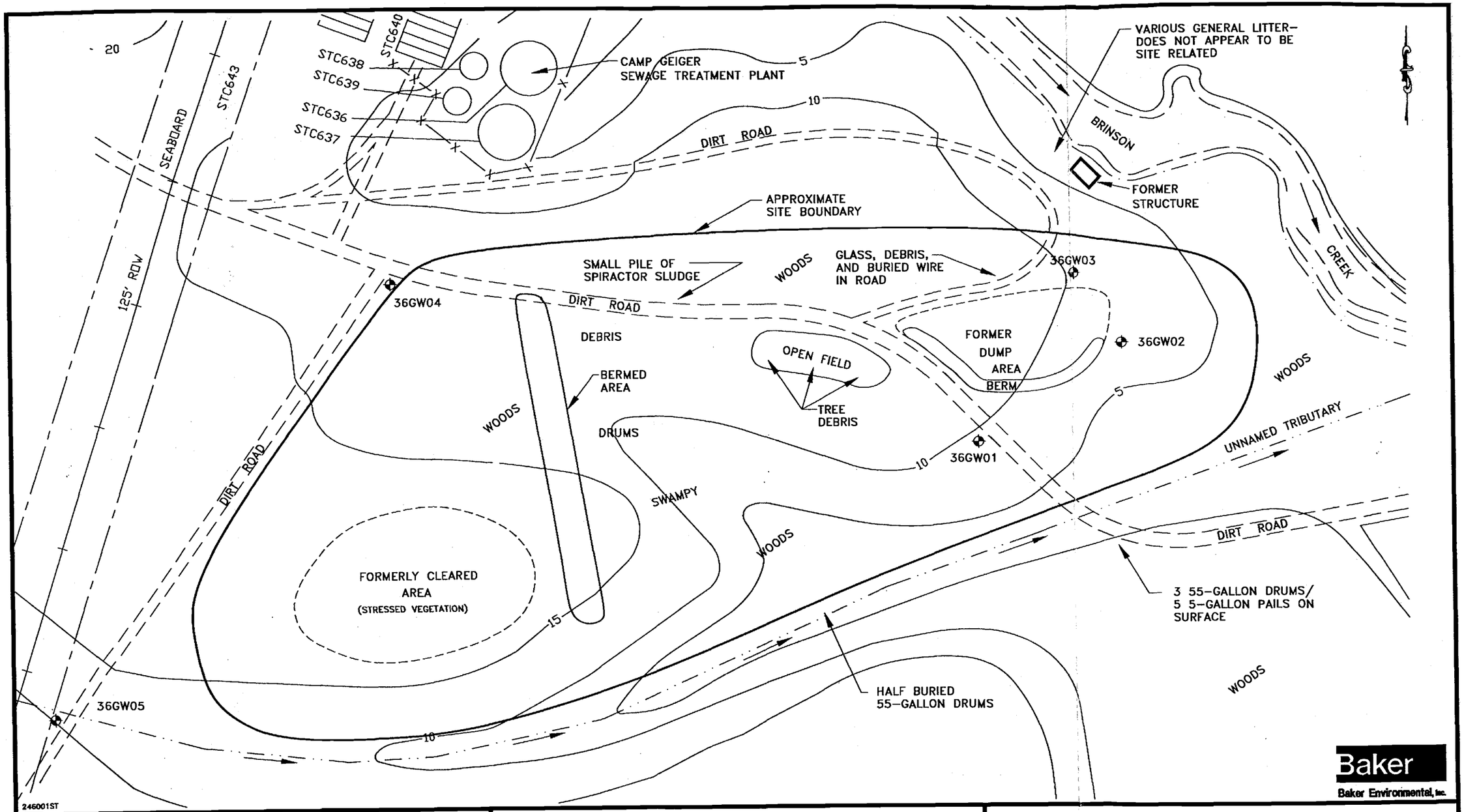
150 0 75 150 300

1 inch = 150 ft.

Baker Environmental, Inc.

FIGURE 1-2
PREVIOUS INVESTIGATION SAMPLE LOCATIONS AND RESULTS
SITE 36:CAMP GEIGER AREA DUMP NEAR SEWAGE TREATMENT PLANT
CTO-0246
MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA

00397M022



Baker
Baker Environmental, Inc.

LEGEND

36GW01 EXISTING SHALLOW MONITORING WELL LOCATION

150 0 75 150 300

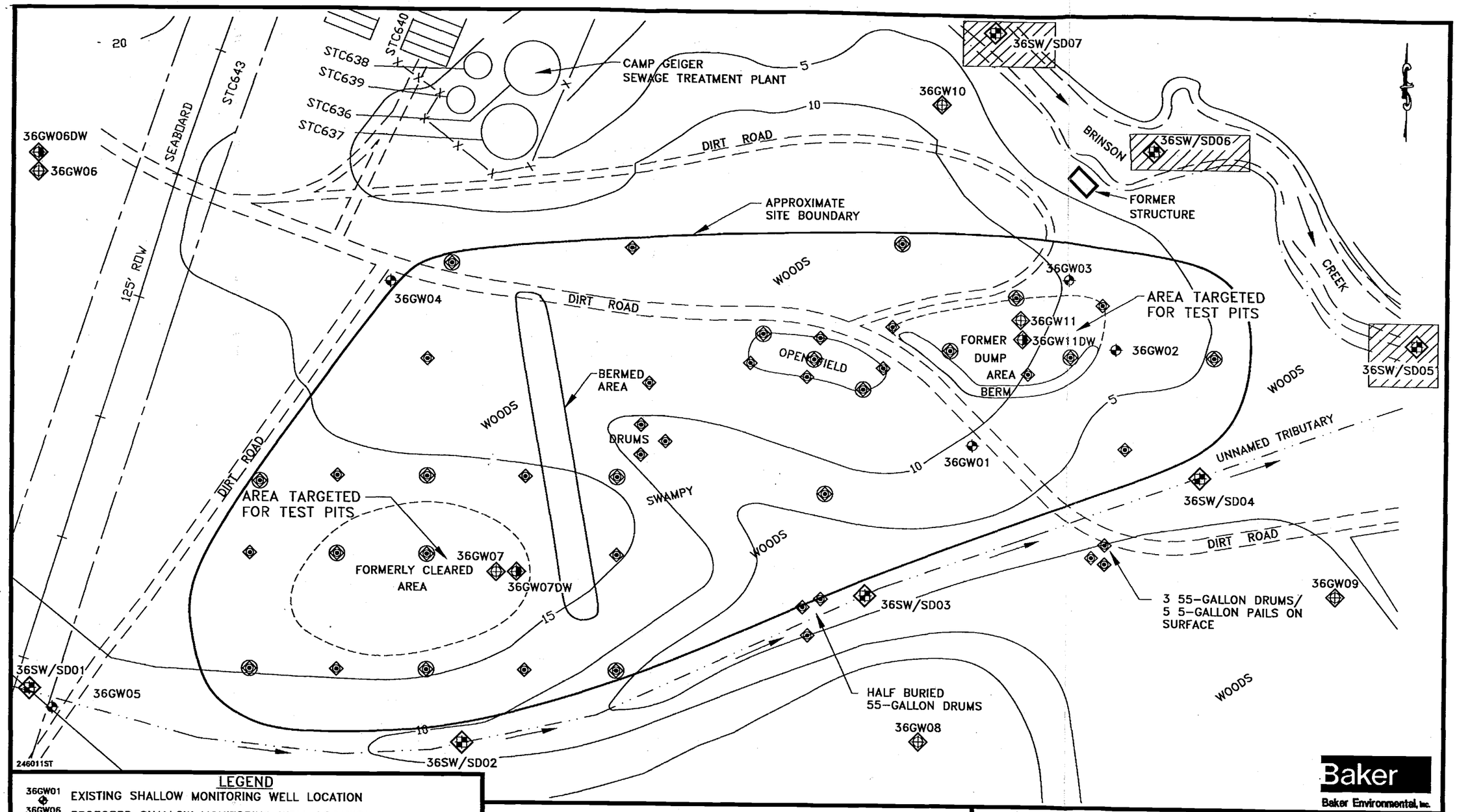
1 inch = 150 ft.

SOURCE: LANTDIV, FEB. 1992

FIGURE 1-3
OBSERVATIONS
SITE 36:CAMP GEIGER AREA DUMP
NEAR SEWAGE TREATMENT PLANT
CTO-0246

MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA

00397M032



LEGEND

- 36GW01 — EXISTING SHALLOW MONITORING WELL LOCATION
- 36GW06 — PROPOSED SHALLOW MONITORING WELL LOCATION
- 36GW06DW — PROPOSED DEEP MONITORING WELL LOCATION
- PROPOSED SOIL BORING LOCATION
- PROPOSED SOIL BORING LOCATION (7-DAY TURNAROUND)
- 36SW/SD01 — PROPOSED SURFACE WATER/SEDIMENT SAMPLE STATION
- PROPOSED FISH/CRAB/BENTHIC SAMPLE STATION

SOURCE: LANTDIV, FEB. 1992

150 0 75 150 300

1 inch = 150 ft.

Baker Environmental, Inc.

FIGURE 1-4
PROPOSED SAMPLE LOCATIONS
SITE 36:CAMP GEIGER AREA DUMP
NEAR SEWAGE TREATMENT PLANT
CTO-0246

MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA

00397M042

2.0 OPERABLE UNIT NO. 6, SITE 43, AGAN STREET DUMP

Information presented in Sections 2.1 and 2.2 was obtained from the Baker Site Inspection Report, 1991.

2.1 Site Location and Setting

Site 43 is located at the Marine Corps Air Station (MCAS), New River portion of MCB, Camp Lejeune, to the southeast of the Camp Geiger area (see Figure 2-1). The Air Station and Camp Geiger are considered as a single urban area possessing two separate missions and supported by two unrelated groups of personnel. MCAS, New River encompasses 2,772 acres and is located in the northwestern section of the Complex and lies approximately five miles south of Jacksonville. MCAS, New River includes air support activities, troop housing and personnel support facilities, all of which immediately surround the aircraft operations and maintenance areas.

Camp Geiger, located directly north of MCAS, New River, contains a mixture of troop housing, personnel support and training facilities. Currently, the area is utilized by a number of groups which have no direct relationship to one another. The majority of the land surrounding this area is comprised of buffer zones and unbuildable marshland.

The site is located about one mile north of the main entrance to MCAS, New River and one mile west of the runway. It is a level area approximately 11 acres in size. Site 43 is located off of Agan Street and adjacent to an abandoned sewage disposal facility. To the immediate north of the site is Edwards Creek. Strawhorn Creek, which discharges into Edwards Creek, borders the site to the east and south. Edwards Creek discharges into the New River approximately one-half mile north of the site. Marshes are present in and around most of the site. Much of the area is heavily overgrown and wooded with various narrow dirt roads present throughout the site.

2.2 Site History

Boards, trash, fiberglass and sewage treatment plant (STP) sludge reportedly were disposed on the ground surface. The years of operation are unknown (Halliburton/NUS, 1991). It is reported that minor quantities of solid wastes and possibly petroleum, oil, and lubricants (POL) wastes may also have been disposed on site. However, the type and quantity of the wastes are not known.

2.2.1 Summary of Previous Site Investigations

An Initial Assessment Study (IAS) was conducted in 1983. The IAS concluded that only construction debris was burned on site and no hazardous waste activities occurred.

A Site Inspection was conducted in 1991 by Baker. Environmental sampling and chemical analysis was performed on soil, groundwater, surface water and sediments.

The SI field investigation consisted of the following:

- Installation of three shallow two-inch monitoring wells to a depth of approximately 12 feet.
- Collection of two soil samples from each well boring: one near the ground surface and one just above the water table. (The subsurface sample could not be collected at all locations due to a high water table.)

- Augering of five soil borings (one less than 15 feet deep). Collection of two soil samples from each borehole: one near the surface and one just above the water table. The subsurface sample could not be collected at all locations due to a high water table.

- Collection of one round of groundwater samples for analysis of TCL organics and TAL inorganics.

- Collection of five surface water/sediment samples in two creeks and the marsh. Analysis of all surface water/sediment samples for TCL organics and TAL inorganics.

- Collection of Quality Assurance/Quality Control (QA/QC) samples in accordance with Naval Energy and Environmental Support Activity (NEESA) 20.02-047B.

- Validation of all samples in accordance with United States Environmental Protection Agency (USEPA) guidelines.

Figure 2-2 presents the location of the sampling points for all media investigated during the SI and the results.

2.2.2 Study Findings

Following is a summary of the contaminants that were detected in soil, groundwater, surface water, and sediment samples.

Soil

Polynuclear aromatic hydrocarbons (PAHs) were detected in one surface soil sample (less than 2 parts per million [ppm] total PAH) at location 43MW01. PAHs may be present in this area of the site since two downgradient sediment samples also exhibited low levels of PAHs. No other area of the site exhibited similar organic soil contamination. None of the chemicals detected exceeded EPA Region III risk-based concentrations (RBCs), however various inorganic contaminants such as barium, copper, manganese, nickel, and calcium exceeded twice the base-specific background levels in one or more samples. No inorganic level exceeded regional background values. Table 2-1 presents the organic soil analytical results and a comparison to risk-based concentrations. Table 2-2 presents the inorganic soil analytical results and comparison to twice the background concentrations.

Groundwater

Groundwater was not contaminated with PAHs even at the location where PAHs were observed in soil. This is likely due to the "immobile" nature of PAHs. The only organic contaminant present in groundwater is carbon disulfide. This contaminant was not detected in any other medium. Table 2-3 presents the groundwater analytical results.

Beryllium, cadmium, chromium, lead, iron, manganese, and nickel were detected in concentrations which exceeded either federal maximum contaminant levels (MCLs) and/or state groundwater standards. Groundwater near this site is not utilized as a potable water supply. The nearest water supply wells are located over one-half mile away. These supply wells obtain water from the deeper portion (greater than 160 feet) of the Castle Hayne aquifer.

Surface Water

Copper, iron, lead, manganese, and zinc were detected in surface water above state and/or federal standards. Based on these standards, aquatic life could potentially be adversely impacted. Benzoic acid (a semivolatile organic compound) was the only organic contaminant detected in the surface water samples. There is no state water quality standard, federal Ambient Water Quality Criteria (AWQC), or Freshwater Water Quality Screening Value (FWSV) for benzoic acid. Table 2-4 presents the surface water analytical results.

Sediments

PAHs may have migrated via surface runoff into Edwards Creek and the low-lying marsh areas. PAHs were detected at the confluence of Edwards Creek and Strawhorn Creek, just downgradient from the soil sample location where PAHs were detected at the surface. Along with the occurrences of PAHs at two of the five sediment sampling locations, the pesticides 4,4'-DDE and 4,4'-DDD were present in low concentrations (less than 580 micrograms per kilogram [μg/kg]) at three locations. No pesticides were detected in soil, groundwater, or surface water. The pesticides may be associated with historical mosquito control practices. (Low pesticide levels have been detected in most streams and creeks throughout MCB, Camp Lejeune.)

Sediment screening values for the protection of biota were exceeded by lead and zinc levels in sediment. The concentrations of these contaminants fall in the range as potentially causing "possible" adverse effects on biota. The pesticides detected in the sediment were at levels where adverse effects on biota are "probable." Table 2-5 presents the sediment analytical results.

2.3 Site Observations

The following provides a brief description of Site 43 field observations which were noted during the site visit from March 16 through 18, 1994. Figure 2-2 depicts the locations of the features noted during the site visit.

- The three existing monitoring wells had been vandalized and need to be replaced.
- The area immediately south of the access road was extremely swampy - could not enter.
- Standing water was observed along both sides of the access road along the southern and eastern portions of the site.
- The area between the access roads was flat and vegetated with pine trees. No visible area of concern was identified.
- The areas south-southeast of well 43GW02 contained numerous soil mounds. Drums were also identified in one area.
- The area east of well 43GW03 was swampy.
- The area north of well 43GW03 contained concrete debris, and a small area of buried 5-gallon containers.
- The area north and west of well 43GW01 contained soil mounds and construction rubble. A red-cockaded woodpecker (an endangered species) was identified in this area near Edwards Creek.

2.4 Proposed Sampling Investigation

The following field investigation activities are proposed at Site 43. Sample locations are identified on Figure 2-3.

Soil Borings/Soil Samples

- Mounded Soil Area: Five surface and subsurface sample locations
- Adjacent to Existing Well 43GW01: Four surface and subsurface sample locations
- Debris/Paint Can Disposal Area: Five surface and subsurface sample locations
- Remaining Site Area: Up to seven surface and subsurface sample locations
- Sample Collection From Well Installation: Surface and subsurface samples at shallow wells

Twenty percent of soil samples will be analyzed for full TCL organics and total TAL metals and the remainder of samples will be analyzed for semivolatiles and metals. Samples collected from eight of the boring locations will be subject to an accelerated (7-day) laboratory turnaround time as shown on Figure 2-3. Note that surface samples will be collected from just below ground surface to 12 inches and subsurface samples will be collected just above the water table. A third sample from each boring may also be submitted for analysis if evidence of contamination (i.e., visual or by monitoring instrument) is noted.

Well Installation/Groundwater Samples

- One shallow/deep monitoring well cluster (43GW04 and 43GW04DW) will be installed upgradient from the site. These wells will serve as background wells for both Sites 43 and 44.
- The three existing shallow monitoring wells (43GW01, 43GW02, and 43GW03) will be abandoned and replaced with new monitoring wells.
- One deep monitoring well (43GW01DW) will be installed adjacent to shallow well 43GW01.
- Temporary shallow monitoring wells will be installed along Edwards Creek (one) and Straw Horn Creek (three).

The shallow monitoring wells will be installed within the surficial aquifer at an estimated depth of 15 to 20 feet below ground surface. The deep monitoring wells (Type III or double-cased wells) will be installed below the semi-confining layer which separates the surficial aquifer and deeper Castle Hayne aquifer. Based on published information obtained from a USGS report for MCB Camp Lejeune, the semi-confining layer is present at a depth between 40 and 60 feet. Temporary monitoring wells will be installed approximately five feet below the water table.

Groundwater samples collected from replacement shallow monitoring wells will be analyzed for total and dissolved TAL metals and groundwater samples collected from temporary wells and newly installed upgradient well will be analyzed for volatiles, semivolatiles, pesticides, and total and dissolved TAL

metals. Samples collected form the deep monitoring wells will be analyzed for total and dissolved TAL metals.

Surface Water/Sediment Samples

- Edwards Creek: Two sample stations
- Straw Horn Creek: Four sample stations

Surface water and sediment samples will be analyzed for full TCL organics and total TAL metals. Moreover, surface water and sediment samples will be obtained from the same stations and will be subject to bioassay tests.

Test Pit Samples

- Three to five shallow test pits (approximately 5 feet in depth and 10 feet long) will be trenched in areas identified during the field investigation which have surficial debris or are suspected of being disposal areas. Samples may be collected from each pit (if visual contamination is noted) for analysis of full TCL organics, total TAL metals, and full TCLP organics and metals.

SECTION 2.0
Tables

TABLE 2-1
SOIL ANALYTICAL RESULTS/COMPARISON TO RISK-BASED CONCENTRATIONS
SITE 43 - AGAN STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number	RBCs (1)		43SB0100		43SB0103		43SB0200		43SB0200DUP		43SB0204	
Sample Depth (feet)	Residential	Industrial	0-2		3-5		0-2		0-2		4-6	
Parameter: Units (ug/kg)												
Semi-volatiles:												
Phenanthrene	NA	NA	380	U	490	U	350	U	350	U	400	U
Di-n-butylphthalate	7,800,000	100,000,000	380	U	490	U	350	U	350	U	400	U
Fluoranthene	3,100,000	4,100,000	380	U	490	U	350	U	350	U	400	U
Pyrene	2,300,000	31,000,000	380	U	490	U	350	U	350	U	400	U
Benzo(a)anthracene	16,000	39,000	380	U	490	U	350	U	350	U	400	U
Chrysene	16,000,000	39,000,000	380	U	490	U	350	U	350	U	400	U
bis(2-Ethylhexyl)phthalate	85,000	200,000	380	U	490	U	350	U	350	U	400	U
Benzo(b)fluoranthene	16,000	39,000	380	U	490	U	350	U	350	U	400	U
Benzo(k)fluoranthene	16,000	39,000	380	U	490	U	350	U	350	U	400	U
Benzo(a)pyrene	1,600	3,900	380	U	490	U	350	U	350	U	400	U
Indeno(1,2,3-cd)pyrene	1,600	3,900	380	U	490	U	350	U	350	U	400	U
Benzo(g,h,i)perylene	NA	NA	380	U	490	U	350	U	350	U	400	U

NOTES:
ug/kg - Microgram per kilogram.
U - Not detected above the Contract Required Quantitation Limit (CRQL).
DUP - Duplicate.
NA - Value not available.
(1) RBCs - Risk-based Concentrations, Smith, 1993.
(2) Shading indicates that chemical exceeded RBC (none exceeded).
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 2-1
SOIL ANALYTICAL RESULTS/COMPARISON TO RISK-BASED CONCENTRATIONS
SITE 43 - AGAN STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number	RBCs (1)		43SB0300		43SB0400		43SB0403		43SB0500		43SB0506	
Sample Depth (feet)	Residential	Industrial	0-2		0-2		3-5		0-2		6-8	
Parameter: Units (ug/kg)												
Semi-volatiles:												
Phenanthrene	NA	NA	400	U	380	U	440	U	350	U	380	U
Di-n-butylphthalate	7,800,000	100,000,000	400	U	380	U	440	U	350	U	380	U
Fluoranthene	3,100,000	4,100,000	400	U	380	U	440	U	350	U	380	U
Pyrene	2,300,000	31,000,000	400	U	380	U	440	U	350	U	380	U
Benzo(a)anthracene	16,000	39,000	400	U	380	U	440	U	350	U	380	U
Chrysene	16,000,000	39,000,000	400	U	380	U	440	U	350	U	380	U
bis(2-Ethylhexyl)phthalate	85,000	200,000	400	U	380	U	440	U	350	U	380	U
Benzo(b)fluoranthene	16,000	39,000	400	U	380	U	440	U	350	U	380	U
Benzo(k)fluoranthene	16,000	39,000	400	U	380	U	440	U	350	U	380	U
Benzo(a)pyrene	1,600	3,900	400	U	380	U	440	U	350	U	380	U
Indeno(1,2,3-cd)pyrene	1,600	3,900	400	U	380	U	440	U	350	U	380	U
Benzo(g,h,i)perylene	NA	NA	400	U	380	U	440	U	350	U	380	U

NOTES:
ug/kg - Microgram per kilogram.
U - Not detected above the Contract Required Quantitation Limit (CRQL).
DUP - Duplicate.
NA - Value not available.
(1) RBCs - Risk-based Concentrations, Smith, 1993.
(2) Shading indicates that chemical exceeded RBC (none exceeded).
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 2-1
SOIL ANALYTICAL RESULTS/COMPARISON TO RISK-BASED CONCENTRATIONS
SITE 43 - AGAN STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number	RBCs (1)		43MW0100		43MW0100DUP		43MW0200		43MW0202		43MW0300	
Sample Depth (feet)	Residential	Industrial	0-2		0-2		0-2		2-4		0-2	
Parameter: Units (ug/kg)												
Semi-volatiles:												
Phenanthrene	NA	NA	57	J	370	U	360	U	410	U	390	U
Di-n-butylphthalate	7,800,000	100,000,000	89	J	40	J	360	U	410	U	390	U
Fluoranthene	3,100,000	4,100,000	230	J	110	J	360	U	410	U	390	U
Pyrene	2,300,000	31,000,000	210	J	94	J	360	U	410	U	390	U
Benzo(a)anthracene	16,000	39,000	110	J	55	J	360	U	410	U	390	U
Chrysene	16,000,000	39,000,000	160		73	J	360	U	410	U	390	U
bis(2-Ethylhexyl)phthalate	85,000	200,000	200	J	100	J	49	J	54	J	72	J
Benzo(b)fluoranthene	16,000	39,000	300	J	160	J	360	U	410	U	390	U
Benzo(k)fluoranthene	16,000	39,000	300	J	160	J	360	U	410	U	390	U
Benzo(a)pyrene	1,600	3,900	110	J	56	J	360	U	410	U	390	U
Indeno(1,2,3-cd)pyrene	1,600	3,900	64	J	370	U	360	U	410	U	390	U
Benzo(g,h,i)perylene	NA	NA	80	J	42	J	360	U	410	U	390	U

NOTES:
ug/kg - Microgram per kilogram.
U - Not detected above the Contract Required Quantitation Limit (CRQL).
DUP - Duplicate.
NA - Value not available.
(1) RBCs - Risk-based Concentrations, Smith, 1993.
(2) Shading indicates that chemical exceeded RBC (none exceeded).
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 2-2
SOIL ANALYTICAL RESULTS/COMPARISON TO BACKGROUND CONCENTRATIONS
SITE 43 - AGAN STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number Sample Depth (feet)	USGS (1)	Base-Specific Background (2)	43SB0100 0-2		43SB0103 3-5		43SB0200 0-2		43SB0200DUP 0-2		43SB0204 4-6	
Parameter: Units (mg/kg)												
Inorganics:												
Aluminum	66000	10780	1630		4710		4020		5640		2590	
Barium	554	28	3.5	U	77.6		7.2	U	10.6	U	6.1	U
Calcium	24000	634	245	U	510		149	U	218	U	64.4	U
Chromium	53	13.8	2.5		9.7		4.3	J	5.9	J	3.6	J
Copper	25	4.2	2.9		2.0		0.98		1.1		1.1	
Iron	25000	10140	763		1600		3050		4790		738	
Lead	20	26	4.6		2.1		3.6		5.3		4.0	
Magnesium	9200	452	70.6		250		115	U	180	U	71.1	U
Manganese	560	10.8	3.3	U	23.5		7.1	U	6.3	U	3.0	U
Nickel	20	ND	1.0	U	2.7	U	1.9	U	1.9	U	2.2	U
Potassium	--	600	126		350		223	U	225	U	264	U
Thallium	--	ND	0.47	U	0.58	U	0.43	U	0.42	U	0.5	U
Vanadium	--	19.4	2.3		7.3		6.9		9.6		2.9	
Zinc	54	8.8	4.8		8.4		4.0		5.4	U	5.4	U

NOTES:
mg/kg - Milligram per kilogram.
U - Not detected above the Contract Required Quantitation Limit (CRQL).
J - Estimated value, reported value may not be accurate or precise.
ND - Not detected.
(--) - Value not given.
DUP - Duplicate.
Shading indicates that chemical exceeded twice the base-specific background.
(1) These values are the background level of the constituents found in the cultivated and uncultivated soils in the eastern U.S. (Shacklette, 1984).
(2) Twice the regional base-specific background average of three samples (Halliburton/NUS, 1991).
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 2-2
SOIL ANALYTICAL RESULTS/COMPARISON TO BACKGROUND CONCENTRATIONS
SITE 43 - AGAN STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number Sample Depth (feet)	USGS (1)	Base-Specific Background (2)	43SB0300 0-2		43SB0400 0-2		43SB0403 3-5		43SB0500 0-2		43SB0506 6-8	
Parameter: Units (mg/kg)												
Inorganics:												
Aluminum	66000	10780	658	J	2310	J	621	J	5280		489	
Barium	554	28	2.2		4.9		2.3		8.4	U	1.7	U
Calcium	24000	634	27.7	U	69.8	U	63.7	U	61.8	U	20.9	U
Chromium	53	13.8	2.2		4.0		1.2		5.7		1.9	
Copper	25	4.2	1.2		0.91	U	2.3		5.4		2.2	
Iron	25000	10140	419		894		263		2400		272	
Lead	20	26	1.6		4.5		1.8		2.7		1.3	
Magnesium	9200	452	29.5		90.6		34.5		142		23.4	
Manganese	560	10.8	2.0		5.4		2.2		17.4		1.8	U
Nickel	20	ND	2.2	U	2.1	U	2.4	U	2.0	U	2.0	U
Potassium	--	600	255	U	244	U	286	U	235	U	241	U
Thallium	--	ND	0.49	U	0.47	U	0.52	U	0.44	U	0.45	U
Vanadium	--	19.4	1.4		3.7		1.2		6.6		0.95	
Zinc	54	8.8	3.1		3.0		3.1		8.0		6.5	

NOTES:
mg/kg - Milligram per kilogram.
U - Not detected above the Contract Required Quantitation Limit (CRQL).
J - Estimated value, reported value may not be accurate or precise.
ND - Not detected.
(--) - Value not given.
DUP - Duplicate.
Shading indicates that chemical exceeded twice the base-specific background.
(1) These values are the background level of the constituents found in the cultivated and uncultivated soils in the eastern U.S. (Shacklette, 1984).
(2) Twice the regional base-specific background average of three samples (Halliburton/NUS, 1991).
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 2-2
SOIL ANALYTICAL RESULTS/COMPARISON TO BACKGROUND CONCENTRATIONS
SITE 43 - AGAN STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number Sample Depth (feet)	USGS (1)	Base-Specific Background (2)	43MW0100 0-2		43MW0100DUP 0-2		43MW0200 0-2		43MW0202 2-4		43MW0300 0-2	
Parameter: Units (mg/kg)												
Inorganics:												
Aluminum	66000	10780	3810		3720		2880		4550		4460	
Barium	554	28	11.8	U	10.2	U	5.7	U	9.0	U	9.5	U
Calcium	24000	634	6720		5460		93.3		68.6	U	618	
Chromium	53	13.8	8.3		6.6		3.6		6.7		6.8	
Copper	25	4.2	3.4		1.6		2.5		0.97	U	1.1	
Iron	25000	10140	2190		1800		1530		1340		2140	
Lead	20	26	9.8		12.0		3.7		6.1		7.8	J
Magnesium	9200	452	270		224		95.0		176		177	
Manganese	560	10.8	31.2		17.7		7.9		8.2		7.4	
Nickel	20	ND	7.6		2.1	U	2.2		7.3		3.0	
Potassium	--	600	242	U	245	U	237	U	258	U	244	U
Thallium	--	ND	0.45	U	0.46	U	0.44	U	0.49	U	0.47	U
Vanadium	--	19.4	7.2		7.1		4.4		5.8		6.7	
Zinc	54	8.8	20.1		8.3		3.6		3.0		3.5	

NOTES:
mg/kg - Milligram per kilogram.
U - Not detected above the Contract Required Quantitation Limit (CRQL).
J - Estimated value, reported value may not be accurate or precise.
ND - Not detected.
(--) - Value not given.
DUP - Duplicate.
Shading indicates that chemical exceeded twice the base-specific background.
(1) These values are the background level of the constituents found in the cultivated and uncultivated soils in the eastern U.S. (Shacklette, 1984).
(2) Twice the regional base-specific background average of three samples (Halliburton/NUS, 1991).
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 2-3
GROUNDWATER ANALYTICAL RESULTS
SITE 43 - AGAN STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number	43GW011		43GW021		43GW031		43GW031DUP		Standards and Criteria		
									NCWQS	MCLs(2)	Health Advisories (3)
Parameter: Units (ug/L)											
Volatiles:											
Carbon Disulfide	7		5	U	5	U	5	U			
Inorganics:											
Aluminum	124000		177000		66000		78300		--	50-200 (5)	--
Arsenic	25.0	U	23.4		5.0	U	5.0	U	50	50	2 (3)
Barium	689		745		220		233		--	2000	2000
Beryllium	3.1		4.2		1.5		1.7		--	4	0.8 (3)
Cadmium	4.0	U	6.9		4.0	U	4.0	U	5	5	5
Calcium	91900		10300		22300		20800		--	--	--
Chromium	177		249		161		181		50	100	100
Cobalt	6.7		27.7		6.0	U	6.0	U	--	--	--
Copper	64.2		67.8		104		94.8		1000	1,300 (4)	--
Iron	70700		105000		126000		134000		300	300 (5)	--
Lead	16.5		28.8		27.7		42.3		15	15 (4)	--
Magnesium	9720		11800		6800		7400		--	--	--
Manganese	220		297		72.6		74.1		50	50 (5)	--
Mercury	0.20	U	0.20	U	0.24		0.20	U	1.1	2	2
Nickel	33.8		143		20.5		29.4		100	100	100
Potassium	8210		10900		5190		6010		--	--	--
Sodium	9160		14600		22100		17900		--	--	--
Vanadium	165		233		122		140		--	--	--
Zinc	192	J	661	J	214	J	300	J	2100	5,000 (5)	2100

NOTES:
ug/L - Microgram per liter.
U - Not detected above Contract Required Quantitation Limits.
J - Estimated value, reported value may not be accurate or precise.
DUP - Duplicate.
(--) - Standard or criteria not available.
Shading indicates that chemical exceeded standard and/or criteria.
(1) North Carolina Water Quality Standards for Groundwater (NCAC, 1993)
(2) National Primary Drinking Water Regulations, Primary Maximum Contaminant Levels (MCLs)
(3) Health Advisories (USEPA, 1993), values represent lifetime exposures, except for arsenic and beryllium which represents 10-04 lifetime risk.
(4) The standard is an action level (July 17, 1992).
(5) National Secondary Drinking Water Regulation, Secondary Maximum Contaminant Levels (SMCLs).

WATER43.XLS / 3/30/94

Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 2-4
SURFACE WATER ANALYTICAL RESULTS
SITE 43 - AGAN STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number	43SW01		43SW02		43SW03		43SW04		43SW05		Standards and Criteria		
											NCWQS (1)	Ambient Water Quality Criteria (2)	Freshwater Water Screening Value (3)
Parameter: Units (ug/L)													
Semi-volatiles:													
Benzoic Acid	50	U	2	J	50	U	50	U	50	U	--	--	--
Inorganics:													
Aluminum	769		803		948		435		529		--		87
Barium	14.4		87.6		11.0		24.6		19.5		1,000	--	--
Calcium	24,700		48,000		23,100		29,900		4,410		--	--	--
Copper	9.8		7.9		11.3		7.0		4	U	7	12	6.54
Iron	3800		15700		1120		3080		603		1,000	1,000	1,000
Lead	2.9	J	7.0	J	21.1		2.8	J	2	U	25	3.2	1.32
Magnesium	1,630		42,300		1,190		2,270		865		--	--	--
Manganese	153		42.6		45.8		23.8		33.1		200	--	--
Nickel	9	U	9	U	9	U	9.2		9	U	88	160	87.71
Potassium	1,250		13,000	J	1,070	U	1,650		1,070	U	--	--	--
Sodium	7,290		401,000		2930		14,100		2,910		--	--	--
Vanadium	4.7		3.8		4.4		3	U	3	U	--	--	--
Zinc	32.1	U	29.6	U	54.3		53.0		18.7	U	50	110	58.91

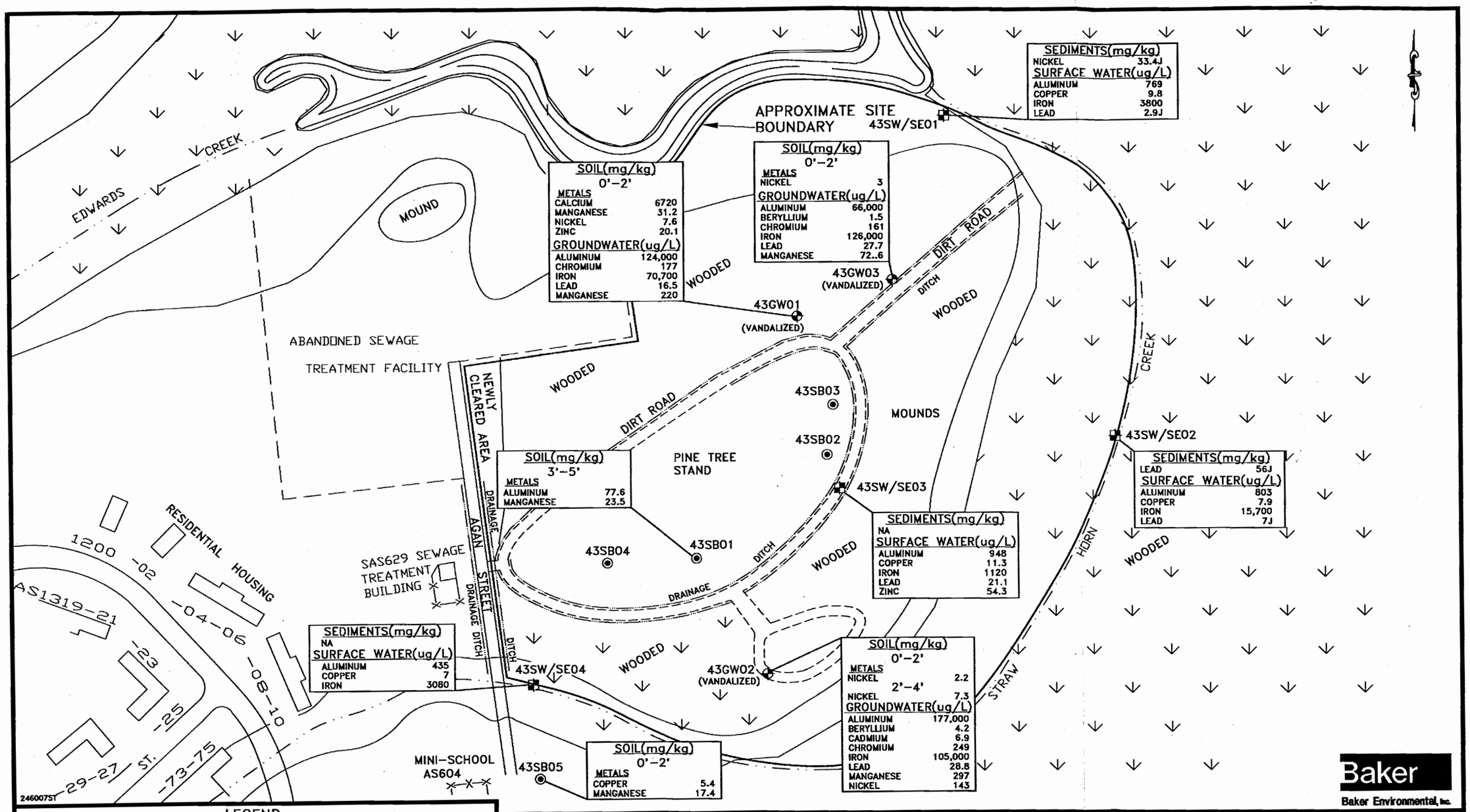
NOTES:
ug/L - Microgram per liter.
U - Not detected above Contract Required Quantitation Limits.
J - Estimated value, reported value may not be accurate or precise.
(--) - Standard or criteria not available.
Shading indicates that chemical exceeded standard and/or criteria.
(1) North Carolina Surface Water Standards for freshwater (NCAC, 1993).
(2) Federal Ambient Water Quality Standards, chronic freshwater (USEPA, 1991)
(3) FWSV - Freshwater Water Quality Screening Value (USEPA Region IV, 1993)
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 2-5
SEDIMENT SAMPLE ANALYTICAL RESULTS
SITE 43 - AGAN STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number	43SD01		43SD02		43SD03		43SD04		43SD05		NOAA SSV (1)	
Parameter: Units											ER-L (2)	ER-M (3)
Semi-volatiles: ug/kg												
2-Methylphenol	810	J	1300	U	390	U	850	U	560	U		
4-Methylphenol	810	J	1300	U	390	U	850	U	64	J		
Benzoic Acid	7600	J	3000	J	1900	U	4100	U	2700	U		
Di-n-butylphthalate	210	J	170	J	59	J	850	U	61	J		
Pyrene	150	J	1300	U	390	U	850	U	560	U	350	2200
Butylbenzylphthalate	1400	U	1300	U	55	J	850	U	560	U		
bis(2-Ethylhexyl)phthalate	1400	U	1300	U	390	U	1600	J	150	J		
Benzo(b)fluoranthene	290	J	1300	U	66	J	850	U	560	U	4000 (4)	35000 (4)
Benzo(k)fluoranthene	290	J	1300	U	66	J	850	U	560	U	4000 (4)	35000 (4)
Pesticides/PCBs: ug/kg												
4,4'-DDE	270		580		19	U	21	U	140	U	2	15
4,4'-DDD	500		310		19	U	21	U	180		2	20
4,4'-DDT	220		63	U	19	U	21	U	140	U	1	7
Inorganics: mg/kg												
Aluminum	6720	J	4510	J	1850		1520		1970		–	–
Barium	25.5	J	32.6	J	5.2	U	11.3	U	9.7	U	–	–
Calcium	9170	J	3330	J	7550		6880		4400		–	–
Chromium	6.9	J	5.0	J	3.6		4.2		2.9		80	145
Copper	13.2	J	9.2	J	1.9		3.6		2.6		70	390
Iron	6930	J	2850	J	787		1720		1290		–	–
Lead	28.3	J	56.0	J	7.4		28.2		8.5		35	110
Magnesium	831	J	1300	J	185		170		259		–	–
Manganese	92.1	J	8.9	J	6.7		6.5		6.8		–	–
Nickel	33.4	J	6.9	U	3.7		3.5		3.1	U	30	50
Sodium	549	U	2930	J	130	U	179	U	345	U		
Vanadium	18.6	J	12.9	J	3.6		5.0		4.0		–	–
Zinc	77.0	J	26.9	J	11.6		96.2		10.5		120	270

NOTES:
ug/L - Microgram per liter.
mg/kg - Milligram per kilogram.
U - Not detected above Contract Required Quantitation Limits.
J - Estimated value, reported value may not be accurate or precise.
(–) - Value is not available.
Shading indicates that chemical exceeded NOAA SSV.
(1) NOAA SSV - National Oceanic and Atmospheric Administration Sediment Screening Values (USEPA Region IV, 1992).
(2) ER-L - Effects range - low, if contaminant concentrations fall below the ER-L adverse aquatic effects are considered unlikely.
(3) ER-M - Effects range - median, if contaminant concentrations fall above the ER-M adverse aquatic effects are considered probable. If the value falls between ER-L and ER-M adverse aquatic effects are considered possible.
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

SECTION 2.0
Figures



Baker

Baker Environmental, Inc.

LEGEND

- 43GW01 — EXISTING SHALLOW MONITORING WELL LOCATION
- 43SB01 — PREVIOUS SOIL BORING LOCATION
- 43SW/SE01 — PREVIOUS SURFACE WATER/SEDIMENT SAMPLE STATION
- NA — NOT APPLICABLE

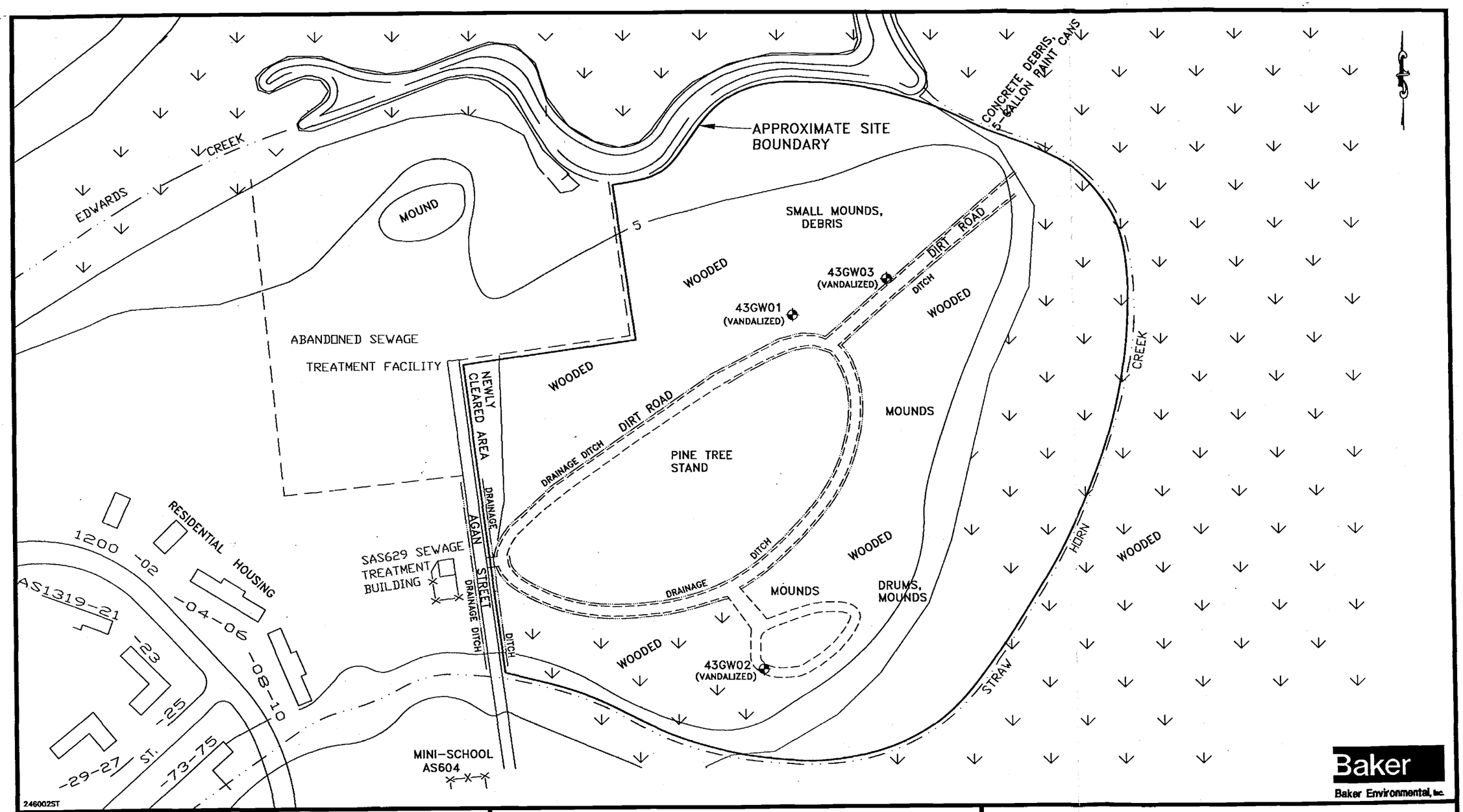
NOTES:
–ALL RESULTS PRESENTED IN ug/L OR mg/kg.
–ONLY THOSE CONCENTRATIONS WHICH EXCEED STATE/FEDERAL STANDARDS, OR RISK–BASED/BASE BACKGROUND ARE SHOWN.
SOURCE: LANTDIV, FEB. 1992

150 0 75 150 300

1 inch = 150 ft.

FIGURE 2–1
PREVIOUS INVESTIGATION SAMPLE LOCATIONS AND RESULTS
SITE 43: AGAN STREET DUMP
CTO–0246
MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA

00397M057



Baker

Baker Environmental, Inc.

LEGEND

43GW01 EXISTING SHALLOW MONITORING WELL LOCATION

150 0 75 150 300

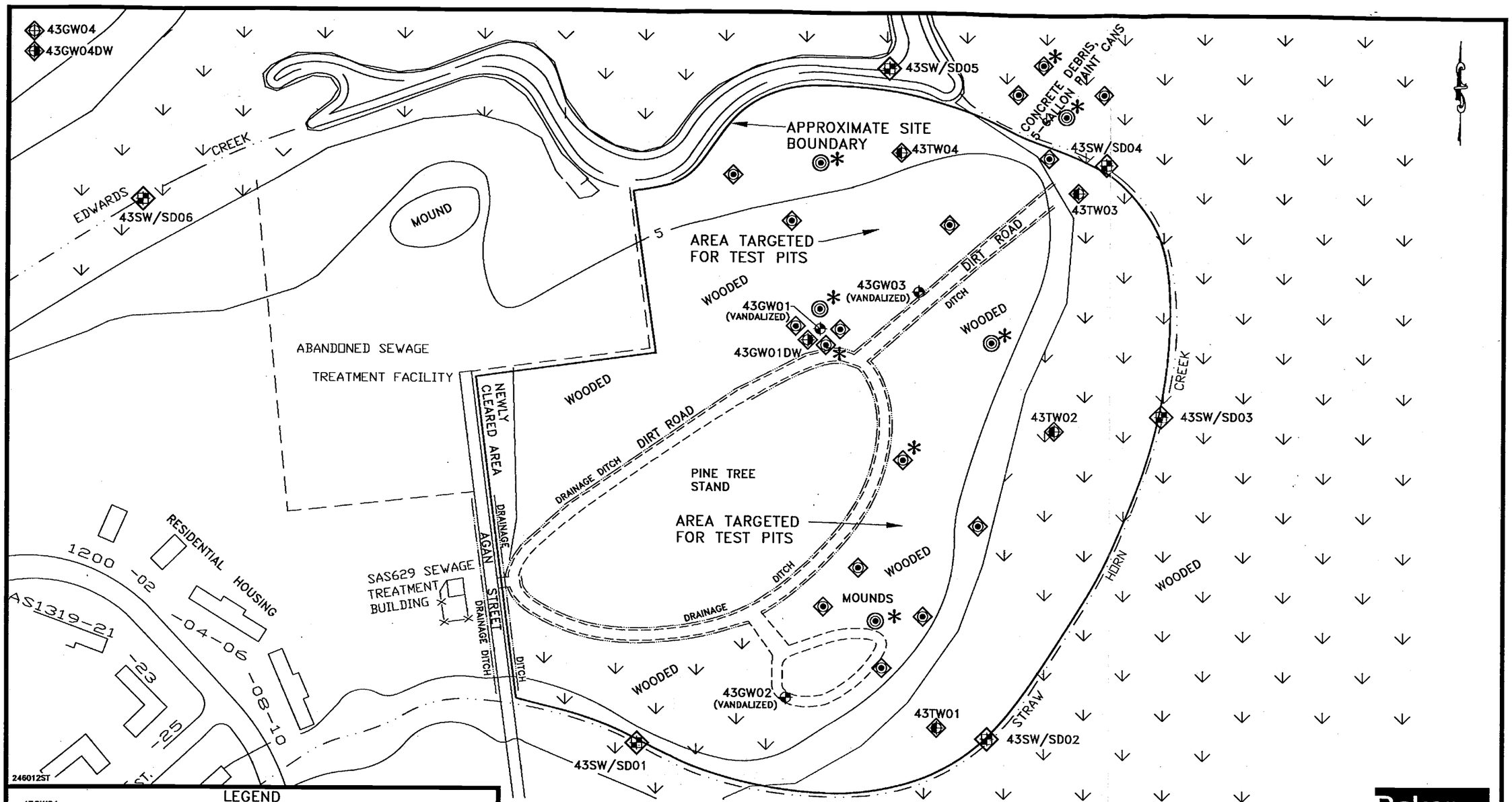
1 inch = 150 ft.

SOURCE: LANTDIV, FEB. 1992

FIGURE 2-2
OBSERVATIONS
SITE 43: AGAN STREET DUMP
CTO-0246

MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA

00397M062



LEGEND

- 43GW01 — EXISTING SHALLOW MONITORING WELL LOCATION(TO BE REPLACED)
- 43GW04 — PROPOSED SHALLOW MONITORING WELL LOCATION
- 43GW01DW — PROPOSED DEEP MONITORING WELL LOCATION
- 43TW01 — PROPOSED TEMPORARY MONITORING WELL LOCATION
- PROPOSED SOIL BORING LOCATION
- PROPOSED SOIL BORING LOCATION (FULL ORGANICS/METALS ANALYSIS)
- 43SW/SD01 — PROPOSED SURFACE WATER/SEDIMENT SAMPLE STATION
- DENOTES 7-DAY TURNAROUND ANALYSIS

SOURCE: LANTDIV, FEB. 1992

150 0 75 150 300

1 inch = 150 ft.

Baker

Baker Environmental, Inc.

FIGURE 2-3
PROPOSED SAMPLE LOCATIONS
SITE 43: AGAN STREET DUMP
CTO-0246

MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA

00397M073

3.0 OPERABLE UNIT NO. 6, SITE 44, JONES STREET DUMP

Information presented in Sections 3.1 and 3.2 was obtained from the Baker Site Inspection Report, 1991.

3.1 Site Location and Setting

The Jones Street Dump site is located at MCAS, New River. MCAS is situated west of the New River in the northwestern section of MCB, Camp Lejeune (see Figure 3-1). The site is located behind Jones Street in a base-housing area of MCAS, just to the south of the Camp Geiger Area. It is less than one-quarter mile north of the housing area, and is approximately five acres in size. The center of the site is a level open field covered by weeds and small trees, and is bordered by base residential housing on the south and west and mature forest (deciduous and coniferous) on the north and east.

3.2 Site History

The dump was reportedly in operation in the 1950s, and received mainly debris, cloth, boards, and paint cans. It is reported that minor quantities of potentially hazardous materials (possibly POL wastes) may also have been disposed of on site. However, the type and quantity of the wastes are not known.

3.2.1 Summary of Previous Site Investigations

An IAS was conducted in 1983 by Water & Air Research, Inc. The IAS concluded that construction debris and minor quantities of potentially hazardous waste were disposed of at the dump.

A Site Inspection was conducted in 1991 by Baker. Environmental sampling and chemical analysis was performed on soil, groundwater, surface water, and sediments.

The SI field investigation consisted of the following:

- Installation of three shallow two-inch monitoring wells to a depth of less than 15 feet.
- Collection of two soil samples from each well boring: one near the ground surface and one just above the water table.
- Augering of five soil borings (4 to 11 feet deep). Collection of two soil samples from each borehole: one near the surface and one just above the water table.
- Laboratory analysis of all soil samples for TCL organics and TAL inorganics.
- Collection of one round of groundwater samples for analysis of TCL organics and TAL inorganics.
- Collection of two surface water/sediment samples along Edwards Creek for analysis of TCL organics and TAL inorganics.
- Collection of QA/QC samples in accordance with NEESA 20.02-047B.
- Data validation of all sample analyses in accordance with USEPA guidelines.

Figure 3-2 presents the locations of all of the sampling points for all media investigated during the SI and the results.

3.2.2 Study Findings

The soil at Site 44 exhibited primarily inorganic contamination. Lead, chromium, manganese, and other heavy metals were detected above twice the average base-specific background levels. Only copper exceeded regional background levels. Nonmetallic inorganics such as arsenic were also present above twice the average base-specific background levels. The primary organic contaminants detected on site included low levels of PAHs and the pesticide 4,4'-DDD in one subsurface sample and low levels of the pesticide 4,4'-DDE in one surface soil sample. No one group of organics was highly distributed in site soils. Table 3-1 presents the organic soil analytical results and a comparison to risk-based concentrations. Table 3-2 presents the inorganic analytical results and a comparison to base-specific background concentrations.

Groundwater

Various inorganic compounds were detected in groundwater above state groundwater protection standards and federal drinking water standards. Shallow groundwater is not utilized as a potable water supply. Water supply wells located within a one-half mile radius of the site obtain water from the deeper portion of the Castle Hayne aquifer at depths greater than 160 feet. Four of the five supply wells within a one-half mile radius of the site are operational; however, one supply well (MCAS-106) has been shut down due to trichloroethylene (TCE) contamination. The TCE contamination is not believed to be associated with past disposal practices at the site since (1) TCE was not detected at Site 44, (2) the well is located approximately one-quarter mile from the site, and (3) the well is located near Site 86 (Tank Area AS-419-AS421 at MCAS) and Site 54 (Crash Crew Fire Training Burn Area), which have documented solvent usage. Table 3-3 presents the groundwater analytical results.

Low levels of PAHs (153 μg/kg of total PAHs) were detected in monitoring well 44MW03. The PAHs could be due to suspended soil particles in the sample. It is uncertain whether "dissolved" PAHs are in groundwater since the duplicate of this sample did not contain PAH constituents. Low levels of toluene and ethylbenzene (below state or federal standards) were detected in monitoring well 44MW01.

Surface Water and Sediment

Surface water samples collected from Edwards Creek exhibited low levels of inorganic contamination including arsenic, chromium, iron, lead, copper, and zinc. Sediment samples exhibited slightly elevated levels of copper, lead, and zinc. Trace levels of pesticides and semivolatile constituents were also detected in sediments. Tables 3-4 and 3-5 present the analytical data for surface water and sediment, respectively.

3.3 Site Observations

The following provides a brief description of Site 44 field observations which were noted during the site visit from March 16 through 18, 1994. Figure 3-2 depicts the locations of the features noted during the site visit.

- The formerly cleared area now contains young pine trees and grass (not typical woods vegetation).
- Northeast of the cleared area, a stagnant area was noted near Edwards Creek.
- General litter was evident throughout the site.
- The backyards to several houses are immediately adjacent to the site; yielding easy access to the site.

- The area south and southwest of well 44MW02 appeared to have several areas of ponded water - swampy.

- A vehicle engine (Honda) was disposed in a drainage ditch in the southeast portion of the site.

- The eastern portion of the site was very swampy.

3.4 Proposed Sampling Investigation

The following field investigation activities are proposed at Site 44. Sample locations are identified on Figure 3-3.

Soil Borings/Soil Samples

- Adjacent to Existing Well 44MW03: Four surface and subsurface sample locations

- Remaining Site Area: Up to six surface and subsurface sample locations (including samples obtained from two newly-installed monitoring wells)

- Sample Collection From Well Installation: Surface and subsurface samples at selected wells)

Soil samples will be analyzed for TCL volatiles, semivolatiles, pesticides, and TAL metals. Samples collected from four of the boring locations will be subject to an accelerated (7-day) laboratory turnaround time as shown on Figure 3-3. Note that surface samples will be collected from just below ground surface to 12 inches and subsurface samples will be collected just above the water table. A third sample from each boring may also be submitted for analysis if evidence of contamination (i.e., visual or by monitoring instrument) is noted.

Well Installation/Groundwater Samples

- One deep monitoring well (44MW01DW) will be installed adjacent to existing shallow well 44MW01.

- One shallow monitoring well (44MW04) will be installed north of the Former Cleared Area.

- One shallow monitoring well (44MW05) will be installed southeast of the Former Cleared Area.

- One temporary shallow monitoring well will be installed northeast of existing well 44MW01, near Edwards Creek.

The shallow monitoring wells will be installed within the surficial aquifer at an estimated depth of 15 to 20 feet below ground surface. The deep monitoring wells (Type III or double-cased wells) will be installed below the semi-confining layer which separates the surficial aquifer and deeper Castle Hayne aquifer. Based on published information obtained from a USGS report for MCB Camp Lejeune, the semi-confining layer is present at a depth between 40 and 60 feet. The temporary monitoring well will be installed approximately five feet below the water table.

Groundwater samples collected from all existing and newly installed shallow monitoring wells and temporary well will be analyzed for TCL volatiles, semivolatiles, pesticides, and total and dissolved TAL metals. Samples collected from the newly installed deep monitoring well will be analyzed for TCL volatiles and semivolatiles, and total and dissolved TAL metals.

Surface Water/Sediment Samples

- Edwards Creek: Six sample stations
- Unnamed Tributary: One sample station
- Strawhorn Creek: One sample station

Surface water and sediment samples will be analyzed for TCL volatiles, semivolatiles, and pesticides, and total TAL metals. Additional surface water and sediment samples will be obtained from the same stations and will be subject to bioassay tests.

Test Pit Samples

- Three to five shallow test pits (approximately 5 feet in depth and 10 feet long) will be trenched in areas identified during the field investigation which have surficial debris or are suspected of being disposal areas. Samples may be collected from each pit (if visual contamination or debris is noted) for analysis of full TCL organics, TAL metals, and full TCLP organics and metals.

SECTION 3.0
Tables

TABLE 3-1
SOIL ANALYTICAL RESULTS/COMPARISON TO RISK-BASED CONCENTRATIONS
SITE 44 - JONES STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number	RBCs (1)		44MW0100		44MW0100DUP		44MW0106		44MW0200		44MW02035	
Sample Depth (feet)	Residential	Industrial	0-2		0-2		6-8		0-2		3.5-5.5	
Parameter: Units (ug/kg)												
Volatiles:												
Chloromethane	92,000	220,000	11	U	11	U	1600	U	11	U	12	U
Methylene Chloride	160,000	380,000	21	U	34	U	1100	U	37	U	31	U
Carbon Disulfide	7,800,000	100,000,000	6	U	6	U	800	U	6	U	6	U
Semivolatiles:												
Benzoic Acid	310,000,000	1,000,000,000	1300	U	1800	U	2100	U	1800	U	1900	U
2-Methylnaphthalene	--	--	370	U	380	U	420	U	370	U	390	U
Acenaphthylene	--	--	370	U	380	U	420	U	370	U	390	U
Acenaphthene	4,700,000	61,000,000	370	U	380	U	420	U	370	U	390	U
Dibenzofuran	--	--	370	U	380	U	420	U	370	U	390	U
Fluorene	3,100,000	41,000,000	370	U	380	U	420	U	370	U	390	U
Phenanthrene	--	--	370	U	380	U	420	U	370	U	390	U
Fluoranthene	3,100,000	41,000,000	370	U	380	U	420	U	370	U	390	U
Pyrene	2,300,000	31,000,000	370	U	380	U	76	J	370	U	390	U
Naphthalene	3,100,000	41,000,000	370	U	380	U	420	U	370	U	390	U
Pesticides/PCBs:												
4-4'-DDE	35,000	84,000	18	U	18	U	20	U	18	U	19	U
4-4'-DDD	5,000	12,000	18	U	18	U	20	U	18	U	19	U

NOTES:
ug/kg - Microgram per kilogram
U - Not detected above the Contract Required Quantitation Limit (CRQL)
J - Estimated value, reported value may not be accurate or precise.
(--) - RBC not available.
DUP - Duplicate.
Shading indicates that chemical exceeded RBC (none exceeded).
RBC - Risk-based Concentrations (Smith, 1992)
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 3-1
SOIL ANALYTICAL RESULTS/COMPARISON TO RISK-BASED CONCENTRATIONS
SITE 44 - JONES STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number	RBCs (1)		44MW0300		44MW0306		44SB0100		44SB0102		44SB0200	
Sample Depth (feet)	Residential	Industrial	0-2		6-8		0-2		2-4		0-2	
Parameter: Units (ug/kg)												
Volatiles:												
Chloromethane	92,000	220,000	12	U	1	J	14	U	12	U	11	U
Methylene Chloride	160,000	380,000	34	U	20	U	41	U	39	U	30	U
Carbon Disulfide	7,800,000	100,000,000	6	U	6	U	7	U	6	U	6	U
Semivolatiles:												
Benzoic Acid	310,000,000	1,000,000,000	2200	U	2100	U	2200	U	42	J	39	J
2-Methylnaphthalene	--	--	440	U	170	J	450	U	410	U	370	U
Acenaphthylene	--	--	440	U	120	J	450	U	410	U	370	U
Acenaphthene	4,700,000	61,000,000	440	U	120	J	450	U	410	U	370	U
Dibenzofuran	--	--	440	U	100	J	450	U	410	U	370	U
Fluorene	3,100,000	41,000,000	440	U	100	J	450	U	410	U	370	U
Phenanthrene	--	--	440	U	320	J	450	U	410	U	370	U
Fluoranthene	3,100,000	41,000,000	440	U	160	J	450	U	410	U	370	U
Pyrene	2,300,000	31,000,000	440	U	100	J	450	U	410	U	370	U
Naphthalene	3,100,000	41,000,000	440	U	1100		450	U	410	U	370	U
Pesticides/PCBs:												
4-4'-DDE	35,000	84,000	20	U	21	U	22	U	20	U	30	
4-4'-DDD	5,000	12,000	20	U	48		22	U	20	U	18	U

NOTES:
ug/kg - Microgram per kilogram
U - Not detected above the Contract Required Quantitation Limit (CRQL)
J - Estimated value, reported value may not be accurate or precise.
(--) - RBC not available.
DUP - Duplicate.
Shading indicates that chemical exceeded RBC (none exceeded).
RBC - Risk-based Concentrations (Smith, 1992)
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 3-1
SOIL ANALYTICAL RESULTS/COMPARISON TO RISK-BASED CONCENTRATIONS
SITE 44 - JONES STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number	RBCs (1)		44SB0200D		44SB0206		44SB0300		44SB0306		44SB0400	
Sample Depth (feet)	Residential	Industrial	0-2		6-8		0-2		6-8		0-2	
Parameter: Units (ug/kg)												
Volatiles:												
Chloromethane	92,000	220,000	12	U	12	U	11	U	11	U	14	U
Methylene Chloride	160,000	380,000	35	U	32	U	21	U	24	U	45	U
Carbon Disulfide	7,800,000	100,000,000	6	U	6	U	6	U	6	U	2	J
Semivolatiles:												
Benzoic Acid	310,000,000	1,000,000,000	64	J	1900	U	160	J	67	J	2100	U
2-Methylnaphthalene	--	--	400	U	390	U	370	U	370	U	440	U
Acenaphthylene	--	--	400	U	390	U	370	U	370	U	440	U
Acenaphthene	4,700,000	61,000,000	400	U	390	U	370	U	370	U	440	U
Dibenzofuran	--	--	400	U	390	U	370	U	370	U	440	U
Fluorene	3,100,000	41,000,000	400	U	390	U	370	U	370	U	440	U
Phenanthrene	--	--	400	U	390	U	370	U	370	U	440	U
Fluoranthene	3,100,000	41,000,000	400	U	390	U	370	U	370	U	440	U
Pyrene	2,300,000	31,000,000	400	U	390	U	370	U	370	U	440	U
Naphthalene	3,100,000	41,000,000	400	U	390	U	370	U	370	U	440	U
Pesticides/PCBs:												
4-4'-DDE	35,000	84,000	39		19	U	18	U	18	U	22	U
4-4'-DDD	5,000	12,000	19	U	19	U	18	U	18	U	22	U

NOTES:

ug/kg - Microgram per kilogram

U - Not detected above the Contract Required Quantitation Limit (CRQL)

J - Estimated value, reported value may not be accurate or precise.

(--) - RBC not available.

DUP - Duplicate.

Shading indicates that chemical exceeded RBC (none exceeded).

RBC - Risk-based Concentrations (Smith, 1992)

Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 3-1
SOIL ANALYTICAL RESULTS/COMPARISON TO RISK-BASED CONCENTRATIONS
SITE 44 - JONES STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number	RBCs (1)		44SB0406		44SB0500		44SB0507		44SB0600		44SB0608	
Sample Depth (feet)	Residential	Industrial	6-8		0-2		7-9		0-2		8-10	
Parameter: Units (ug/kg)												
Volatiles:												
Chloromethane	92,000	220,000	12	U	11	U	12	U	11	U	12	U
Methylene Chloride	160,000	380,000	41	U	16		14	U	25	U	20	U
Carbon Disulfide	7,800,000	100,000,000	6	U	6	U	6	U	6	U	6	U
Semivolatiles:												
Benzoic Acid	310,000,000	1,000,000,000	2000	U	1800	U	1900	U	1800	R	2000	U
2-Methylnaphthalene	--	--	410	U	370	U	400	U	370	R	410	U
Acenaphthylene	--	--	410	U	370	U	400	U	370	R	410	U
Acenaphthene	4,700,000	61,000,000	410	U	370	U	400	U	370	R	410	U
Dibenzofuran	--	--	410	U	370	U	400	U	370	R	410	U
Fluorene	3,100,000	41,000,000	410	U	370	U	400	U	370	R	410	U
Phenanthrene	--	--	410	U	370	U	400	U	370	R	410	U
Fluoranthene	3,100,000	41,000,000	410	U	370	U	400	U	370	R	410	U
Pyrene	2,300,000	31,000,000	410	U	370	U	400	U	370	R	410	U
Naphthalene	3,100,000	41,000,000	410	U	370	U	400	U	370	R	410	U
Pesticides/PCBs:												
4-4'-DDE	35,000	84,000	20	U	18	U	19	U	18	U	20	U
4-4'-DDD	5,000	12,000	20	U	18	U	19	U	18	U	20	U

NOTES:
ug/kg - Microgram per kilogram
U - Not detected above the Contract Required Quantitation Limit (CRQL)
J - Estimated value, reported value may not be accurate or precise.
(--) - RBC not available.
DUP - Duplicate.
Shading indicates that chemical exceeded RBC (none exceeded).
RBC - Risk-based Concentrations (Smith, 1992)
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 3-2
SOIL ANALYTICAL RESULTS/COMPARISON TO BACKGROUND CONCENTRATIONS
SITE 44 - JONES STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number Sample Depth (feet)	USGS Background (1)	Base-Specific Background (2)	44MW0100 0-2		44MW0100DUP 0-2		44MW0106 6-8		44MW0200 0-2		44MW02035 3.5-5.5		44MW0300 0-2	
Parameter: Units (mg/kg)														
Inorganics:														
Aluminum	66000	10780	9480	J	11100	J	7050	J	9570	J	4050	J	11000	J
Arsenic	--	3.8	2.0		2.3	J	1.7		3.2	J	1.2	U	10.2	
Barium	554	28	14.8		16.7		17.9		11.9		6.1		18.3	
Calcium	2400	634	7500		11600		4730		87.2		54.1	U	7270	
Chromium	53	13.8	13.0	J	13.9	J	10.0	J	15.5	J	5.6	J	17.4	J
Copper	25	4.2	111	J	44.0	J	25.4	J	27.7	J	6.2	J	62.2	J
Iron	25000	10140	7550	J	7800	J	5570	J	11500	J	1660	J	13700	J
Lead	20	26	7.5		7.0		10.7		7.2		5.5		9.7	
Magnesium	9200	452	461		590		367		371		129		490	
Manganese	560	10.8	11.2		12.9		20.4		7.3		3.5		8.4	
Nickel	20	NA	13.9		8.2		5.4		3.9		3.1		10.3	
Potassium	--	600	342		424		362		454		252	U	454	
Selenium	--	1.04	0.87	U	0.91	U	1	U	0.89		0.94	U	1	U
Vanadium	--	19.4	18.0		20.5		14.7		22.9		5.0		27.4	
Zinc	54	8.8	7.4		8.0		34.9		5.5		3.2		7.0	

NOTES:
mg/kg - Milligram per kilogram
U - Not detected above the Contract Required Quantitation Limit (CRQL)
J - Estimated value, reported value may not be accurate or precise.
DUP - Duplicate.
Shading indicates that chemical exceeded twice the base-specific background concentration
(--) - Value not given.
(1) These values are the regional soil background level averages of the constituents found in the cultivated and uncultivated soils in the eastern U.S. (Shacklette, 1984).
(2) Twice the base-specific soil background concentration, average of three samples (Halliburton/NUS, 1991).
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 3-2
SOIL ANALYTICAL RESULTS/COMPARISON TO BACKGROUND CONCENTRATIONS
SITE 44 - JONES STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number Sample Depth (feet)	USGS Background (1)	Base-Specific Background (2)	44MW0306 6-8	44SB0100 0-2	44SB0102 2-4	44SB0200 0-2	44SB0200DUP 0-2	44SB0206 6-8
Parameter: Units (mg/kg)								
Inorganics:								
Aluminum	66000	10780	6610 J	13100 J	3930 J	8870 J	10800 J	8780 J
Arsenic	--	3.8	3.0	3.9	1.2 U	1.7	1.6	1.2 U
Barium	554	28	22.9	16.0	7.4	16.1	18.6	14.1
Calcium	2400	634	5660	142	36.3 U	12200	3930	77.6
Chromium	53	13.8	12.6 J	26.2 J	5.3 J	11.1 J	12.7 J	9.3 J
Copper	25	4.2	127 J	27.6 J	2.3 J	2.8 J	2.7 J	1.5 J
Iron	25000	10140	8350 J	20500 J	4640 J	8140 J	8160 J	3850 J
Lead	20	26	44.6	12.0	9.8	13.0	9.4	9.6
Magnesium	9200	452	454	510	128	414	384	270
Manganese	560	10.8	31.3	10.7	4.0	9.3	8.1	5.2
Nickel	20	NA	8.7	4.8	2.2 U	2.9	2.5	3.4
Potassium	--	600	481	757	261 U	313	304	364
Selenium	--	1.04	1 U	1.1 U	0.96 U	0.88 U	1.1	0.94 U
Vanadium	--	19.4	16.0	39.2	9.0	22.1	19.1	14.1
Zinc	54	8.8	44.9	10.1	2.8	7.1	6.3	3.5

NOTES:
mg/kg - Milligram per kilogram
U - Not detected above the Contract Required Quantitation Limit (CRQL)
J - Estimated value, reported value may not be accurate or precise.
DUP - Duplicate.
Shading indicates that chemical exceeded twice the base-specific background concentration
(--) - Value not given.
(1) These values are the regional soil background level averages of the constituents found in the cultivated and uncultivated soils in the eastern U.S. (Shacklette, 1984).
(2) Twice the base-specific soil background concentration, average of three samples (Halliburton/NUS, 1991).
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 3-2
SOIL ANALYTICAL RESULTS/COMPARISON TO BACKGROUND CONCENTRATIONS
SITE 44 - JONES STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number Sample Depth (feet)	USGS Background (1)	Base-Specific Background (2)	44SB0300 0-2	44SB0306 6-8	44SB0400 0-2	44SB0406 6-8	44SB0500 0-2	44SB0507 7-9
Parameter: Units (mg/kg)								
Inorganics:								
Aluminum	66000	10780	7110 J	4070 J	12000 J	5250	13500	2140
Arsenic	--	3.8	4.1	1.1 U	4.9	1.2 U	3.9	1.2 U
Barium	554	28	12.8	7.3	13.4	12.8 B	20.2	6.1 U
Calcium	2400	634	4180	763	1600	56.5 U	9080	96.6 U
Chromium	53	13.8	10 J	4.9 J	19.1 J	7.9	17.9	4.6
Copper	25	4.2	2.0 J	1.9 J	2.6 J	1.4 U	2.8	4.5
Iron	25000	10140	7340 J	2090 J	16100 J	2650	15500	1300
Lead	20	26	7.3	6.3	12.5	6.1	8.8	4.5
Magnesium	9200	452	293	129	503	231 J	594	102
Manganese	560	10.8	5.8	4.1	9.2	9.4	12.7	5.1 U
Nickel	20	NA	2.0	6.1	6.9	2.2 U	2.2 U	2.1 U
Potassium	--	600	267	237 U	536	276 J	493	250 U
Selenium	--	1.04	1.1	0.88 U	1 U	0.98 U	0.98 U	0.95 U
Vanadium	--	19.4	14.7	7.0	28.2	8.6 U	27.9	4.3
Zinc	54	8.8	4.0	3.4	7.4	4.0 J	10.1	5.6

NOTES:
mg/kg - Milligram per kilogram
U - Not detected above the Contract Required Quantitation Limit (CRQL)
J - Estimated value, reported value may not be accurate or precise.
DUP - Duplicate.
Shading indicates that chemical exceeded twice the base-specific background concentration
(--) - Value not given.
(1) These values are the regional soil background level averages of the constituents found in the cultivated and uncultivated soils in the eastern U.S. (Shacklette, 1984).
(2) Twice the base-specific soil background concentration, average of three samples (Halliburton/NUS, 1991).
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 3-2
SOIL ANALYTICAL RESULTS/COMPARISON TO BACKGROUND CONCENTRATIONS
SITE 44 - JONES STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number Sample Depth (feet)	USGS Background (1)	Base-Specific Background (2)	44SB0600 0-2	44SB0608 8-10
Parameter: Units (mg/kg)				
Inorganics:				
Aluminum	66000	10780	13400	1310
Arsenic	--	3.8	2.7	1.2 U
Barium	554	28	19.3	3.3 U
Calcium	2400	634	3550	167 U
Chromium	53	13.8	16.8	3.0
Copper	25	4.2	5.1	2.5
Iron	25000	10140	8750	869
Lead	20	26	7.9	1.9
Magnesium	9200	452	576	71.9
Manganese	560	10.8	16.8	3.1 U
Nickel	20	NA	2.1 U	2.2 U
Potassium	--	600	617	264 U
Selenium	--	1.04	0.92 U	0.99 U
Vanadium	--	19.4	22.5	2.3
Zinc	54	8.8	13.6	5.8

NOTES:
mg/kg - Milligram per kilogram
U - Not detected above the Contract Required Quantitation Limit (CRQL)
J - Estimated value, reported value may not be accurate or precise.
DUP - Duplicate.
Shading indicates that chemical exceeded twice the base-specific background concentration
(--) - Value not given.
(1) These values are the regional soil background level averages of the constituents found in the cultivated and uncultivated soils in the eastern U.S. (Shacklette, 1984).
(2) Twice the base-specific soil background concentration, average of three samples (Halliburton/NUS, 1991).
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 3-3
GROUNDWATER ANALYTICAL RESULTS
SITE 44 - JONES STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number	44GW011		44GW021		44GW031		44GW031DUP		Standards and Criteria		
									NCWQSs (1)	MCLs (2)	Health Advisories (3)
Parameter: Units (ug/L)											
Volatiles:											
Carbon Disulfide	6		5	U	5	U	2	J	--	--	--
Toluene	3	J	5	U	5	U	5	U	1000	1000	1000
Ethylbenzene	2	J	5	U	5	U	5	U	29	700	700
Semivolatiles:											
2-Methylnaphthalene	10	U	10	U	10	U	14		--	--	--
Acenaphthene	10	U	10	U	10	U	16		--	--	--
Dibenzofuran	10	U	10	U	10	U	8	J	--	--	--
Phenanthrene	10	U	10	U	10	U	24		--	--	--
Anthracene	10	U	10	U	10	U	3	J	--	--	--
Fluoroanthene	10	U	10	U	10	U	14		--	--	--
Pyrene	10	U	10	U	10	U	9	J	--	--	--
Benzo(a)anthracene	10	U	10	U	10	U	3	J	--	--	--
Naphthalene	10	U	10	U	10	U	62		--	--	--
Inorganics:											
Aluminum	537000		73000		183000		144000		--	50 to 200 (5)	--
Arsenic	570	R	5.0	U	13.0		10.5	J	50	50	2 (3)
Barium	3180		315		1250		1210		2000	2000	2000
Beryllium	36.6		1.4		3.0		2.5		--	4	0.8 (3)
Cadmium	32.0		4.0	U	4.0	U	5.2		5	5	5
Calcium	191000		2430		197000		201000		--	--	--
Chromium	895		126		221		176		50	100	100
Cobalt	93.2		6.0	U	8.0		7.5		--	--	--
Copper	313		28.6		86.6		78.6		1000	1300 (4)	--
Iron	662000		150000		147000		134000		300	300 (5)	--
Lead	508	R	15.8		481		427		15	15 (4)	--
Magnesium	35700		3640		24100		22800		--	--	--
Manganese	1730		88.0		653		641		50	50 (5)	--
Mercury	1.1		0.20	U	0.20	U	0.20	U	1.1	2	2
Nickel	486		21.9		42.8		45.6		100	100	100
Potassium	32500		4540		22300		20900		--	--	--
Sodium	7500		4060		12600		13400		--	--	--
Thallium	2.7		2.0	U	2.0	U	2.0	U	--	2	0.4
Vanadium	759		184		311		266		--	--	--
Zinc	2800	J	87.3	J	1160	J	1110	J	2100	5000 (5)	2000

NOTES:

ug/L - Microgram per liter.

U - Not detected above the Contract Required Quantitation Limit (CRQL).

R - Unreliable result, chemical may or may not be present in the sample.

J - Estimated value, reported value may not be accurate or precise.

(--) - Standard or advisory not set.

DUP - Duplicate.

Shading indicates that chemical exceeded standard and/or criteria, or advisory.

(1) North Carolina Water Quality Standards for groundwater.

(2) National Primary Drinking Water Regulations, Primary Maximum Contaminant Levels (MCLs).

(3) Health Advisories (USEPA, 1993), values represent lifetime exposures, except for arsenic and beryllium which represent 10-04 lifetime risk.

(4) The standard is an action level (July, 1992).

(5) National Secondary Drinking Water Regulation, Secondary Maximum Contaminant Levels (SMCLs).

Source: Baker Environmental, Inc., Site Inspection Report, 1991.

GWATER44.XLS / 3/31/94

TABLE 3-4
SURFACE WATER ANALYTICAL RESULTS
SITE 44 - JONES STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number	44SW01		44SW02		Standards and Criteria: State Water Quality Standards (1)	Standards and Criteria: Ambient Water Quality Criteria (2q)	Standards and Criteria: Freshwater Water Screening Values (3)
Parameter: Units (ug/L)							
Volatiles:							
Carbon Disulfide	18		5	U	–	–	–
1,1,2-Trichloroethane	5	U	3	J	–	9400	940
Inorganics:							
Aluminum	**6930**		**2860**		–	–	87
Arsenic	9.3		5	U	50	–	190
Barium	75.5		41.7		1000	–	–
Calcium	60100		44500		–	–	–
Chromium	**13.3**		4	U	50 (4)	11 (4)	11 (4)
Copper	**24.0**		**11.1**		7	12	6.54
Iron	**24500**		**8780**		1000	1000	1000
Lead	**44.1**		**17.7**		25	3.2	1.32
Magnesium	11000		7870		–	–	–
Manganese	**104**		**84.6**		50	–	–
Nickel	9.6		9	U	25	160	87.71
Potassium	3350		2690		–	–	–
Sodium	85600		60100		–	–	–
Vanadium	34.1		10.1		–	–	–
Zinc	**153**		**83.0**		50	110	58.91

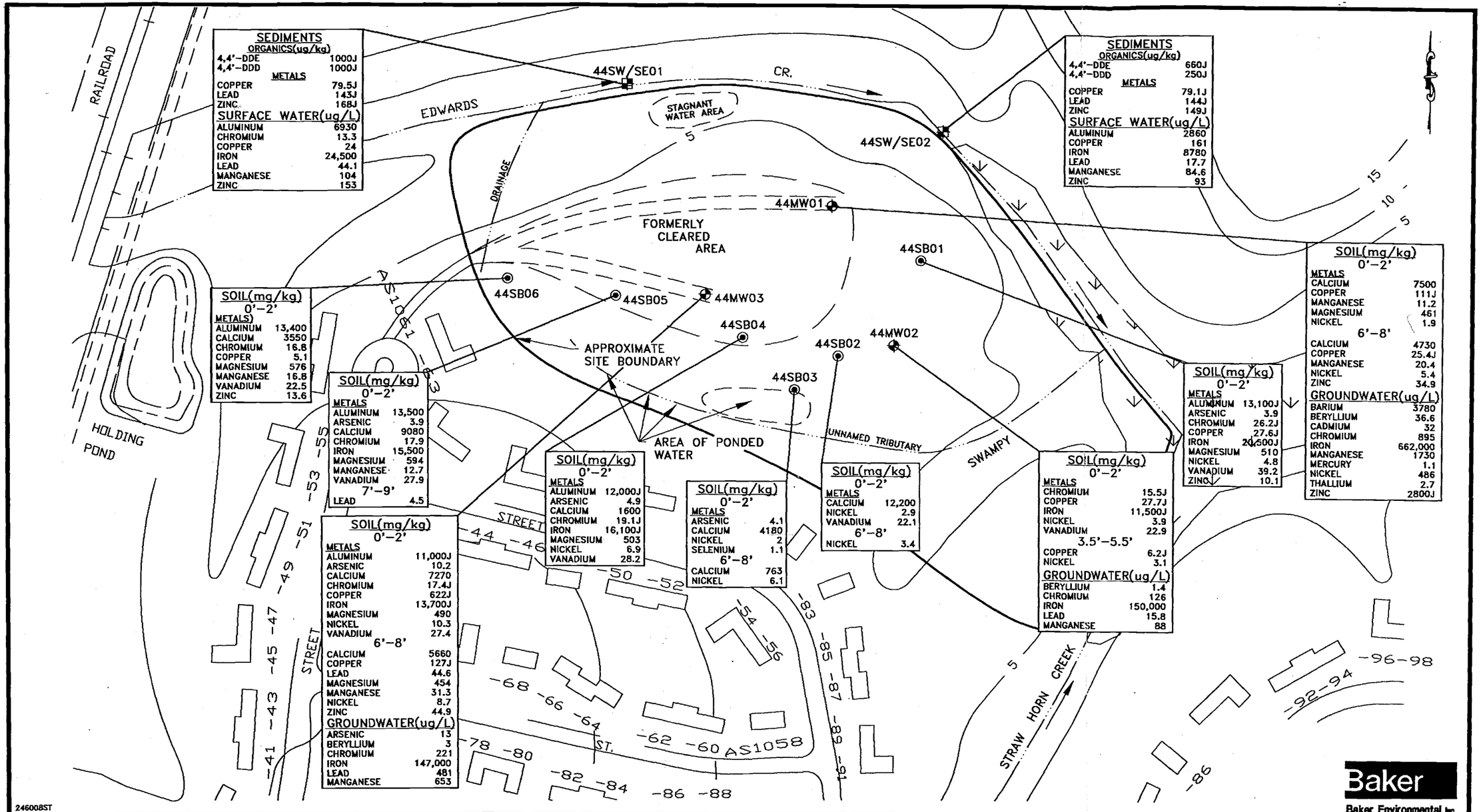
NOTES:
ug/L - Microgram per liter.
U - Not detected above Contract Required Quantitation Limits.
J - Estimated value, reported value may not be accurate or precise.
(–) - Standard or criteria not available.
Shading indicates that chemical exceeded standard and/or criteria.
(1) North Carolina Surface Water Regulations for freshwater aquatic life is more stringent standard to support additional uses (NCAC, 1991).
(2) Federal Ambient Water Quality Standards, chronic freshwater (USEPA, 1991)
(3) FWSV - Freshwater Water Quality Screening Value (USEPA Region IV, 1993)
(4) State standard is for total chromium, AWQC and FWSV is for Chromium VI.
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

TABLE 3-5
SEDIMENT SAMPLE ANALYTICAL RESULTS
SITE 44 - JONES STREET DUMP
SITE INSPECTION, 1991
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number	44SD01		44SD02		NOAA SSV (1) ER-L (2)	NOAA SSV (1) ER-M (3)
Parameter: Units						
Semivolatiles: ug/kg						
4-Methylphenol	140	J	1500	U	--	--
Benzoic Acid	1800	J	1000	J	--	--
2-Methylnaphthalene	110	J	1500	U	0.065	0.67
Di-n-butylphthalate	140	J	170	J	--	--
Butyl Benzyl Phthalate	1100	U	280	J	--	--
bis(2-Ethylhexyl)phthalate	220	J	290	J	--	--
Pesticides/PCBs: ug/kg						
4,4'-DDE	1000	J	660	J	0.002	0.015
4,4'-DDD	1000	J	250	J	0.002	0.02
Inorganics: mg/kg						
Aluminum	15700	J	10900	J	--	--
Arsenic	5.3	J	4.5	U	33	85
Barium	51.7	J	38.6	J	--	--
Calcium	9600	J	10700	J	--	--
Chromium	26.7	J	23.5	J	80	145
Copper	79.5	J	79.1	J	70	390
Iron	11300	J	10200	J	--	--
Lead	143	J	144	J	35	110
Magnesium	1410	J	1880	J	--	--
Manganese	37.5	J	78.8	J	--	--
Nickel	28.9	J	26.9	J	30	50
Potassium	799	J	960	U	--	--
Sodium	897	U	1640	U	--	--
Vanadium	49.4	J	42.8	J	--	--
Zinc	168	J	149	J	120	270

NOTES:
ug/kg - Microgram per kilogram.
mg/kg - Milligram per kilogram.
U - Not detected above the Contract Required Quantitation Limit (CRQL).
J - Estimated value, reported value may not be accurate or precise.
(--) - Value is not available.
Shading indicates that chemical exceeded NOAA SSV.
(1) NOAA SSV - National Oceanic and Atmospheric Administration Sediment Screening Values (USEPA Region IV, 1992).
(2) ER -L - Effects range - low, if contaminant concentrations fall below the ER-L adverse aquatic effects are considered unlikely.
(3) ER-M - Effects range - median, if contaminant concentrations fall above the ER-M adverse aquatic effects are considered probable. If the value falls between ER-L and ER-M adverse aquatic effects are considered possible.
Source: Baker Environmental, Inc., Site Inspection Report, 1991.

SECTION 3.0
Figures



LEGEND

- 44MW01 — EXISTING SHALLOW MONITORING WELL LOCATION
- 44SB01 — PREVIOUS SOIL BORING LOCATION
- 44SW/SE01 — PREVIOUS SURFACE WATER/SEDIMENT SAMPLE STATION

NOTES:
-ALL RESULTS PRESENTED IN ug/L OR mg/kg.
-ONLY THOSE CONCENTRATIONS WHICH EXCEED STATE/FEDERAL STANDARDS, OR RISK-BASED/BASE BACKGROUND ARE SHOWN.
SOURCE: LANTDIV, FEB. 1992

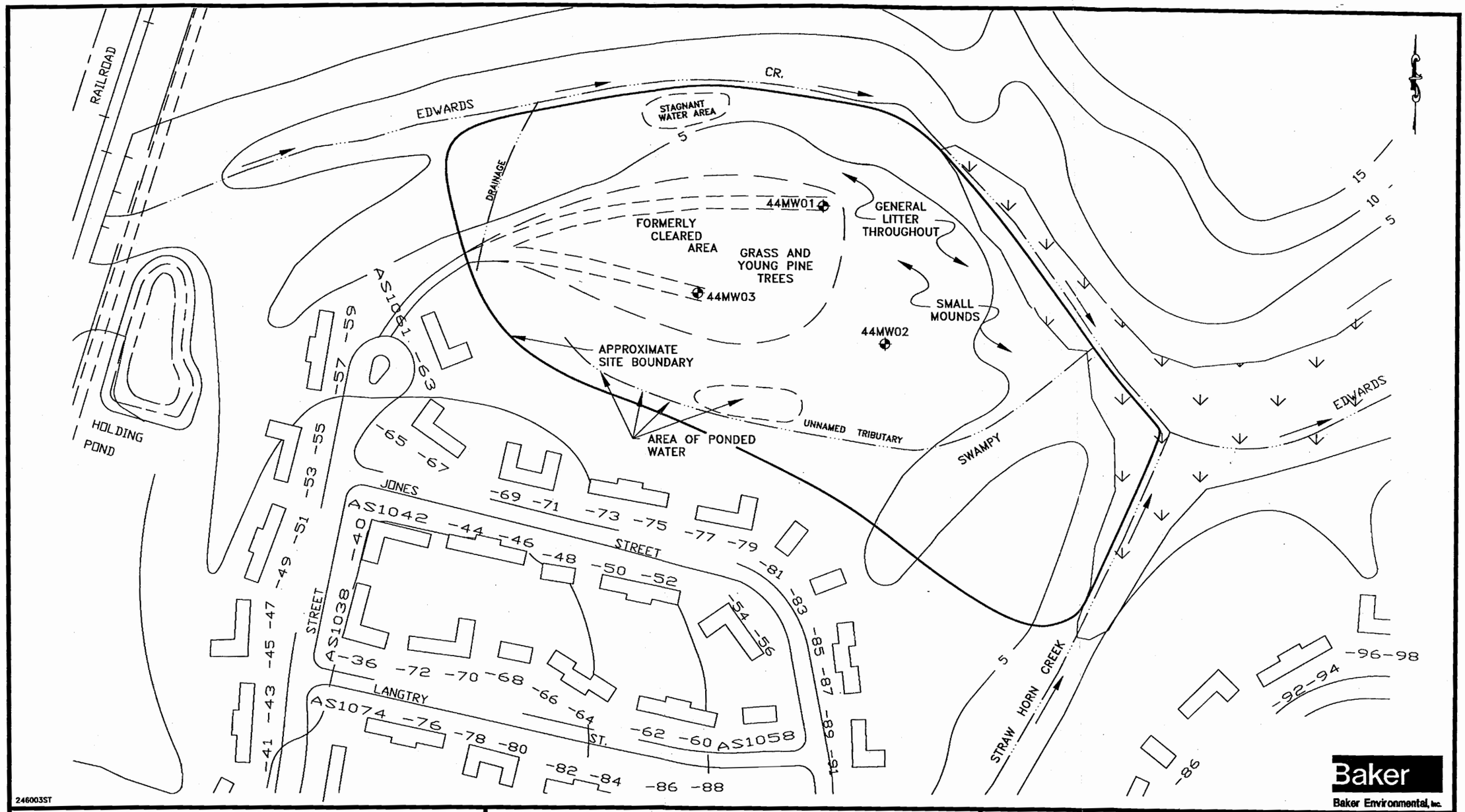
150 0 75 150 300

1 inch = 150 ft.

FIGURE 3-1
PREVIOUS INVESTIGATION SAMPLE LOCATIONS
SITE 44: JONES STREET DUMP
CTO-0246

MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA

00397M087



LEGEND

44MW01 EXISTING SHALLOW MONITORING WELL LOCATION

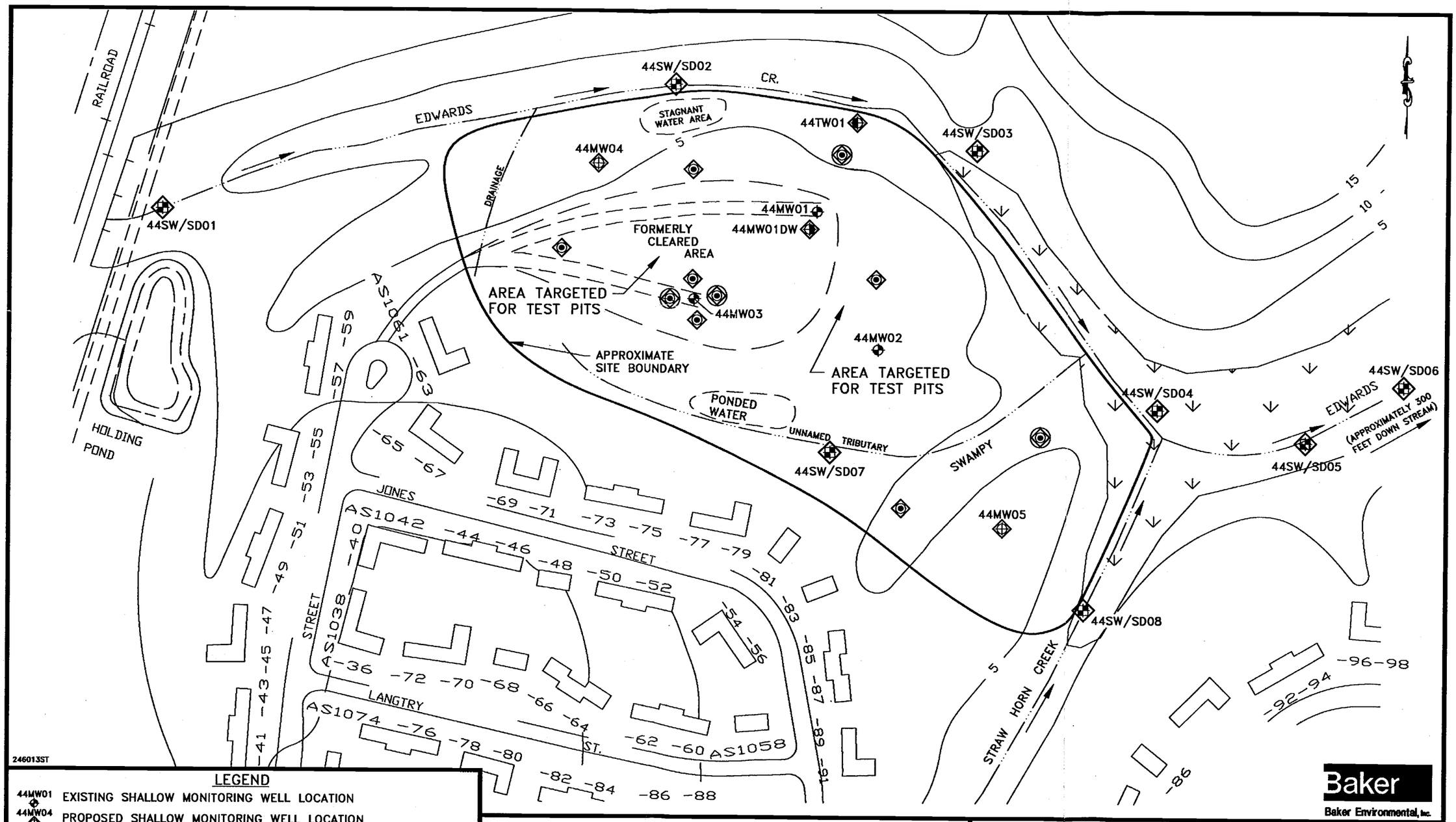
SOURCE: LANTDIV, FEB. 1992

150 0 75 150 300

1 inch = 150 ft.

FIGURE 3-2
OBSERVATIONS
SITE 44: JONES STREET DUMP
CTO-0246

MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA



LEGEND

- 44MW01 EXISTING SHALLOW MONITORING WELL LOCATION
- 44MW04 PROPOSED SHALLOW MONITORING WELL LOCATION
- 44GW010W PROPOSED DEEP MONITORING WELL LOCATION
- 44TW01 PROPOSED TEMPORARY MONITORING WELL LOCATION
- PROPOSED SOIL BORING LOCATION
- PROPOSED SOIL BORING LOCATION (7-DAY TURNAROUND)
- 44SW/SD01 PROPOSED SURFACE WATER/SEDIMENT SAMPLE STATION

SOURCE: LANTDIV, FEB. 1992

150 0 75 150 300

1 inch = 150 ft.

Baker Environmental, Inc.

FIGURE 3-3
PROPOSED SAMPLE LOCATIONS
SITE 44: JONES STREET DUMP
CTO-0246

MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA

00397M10Z

4.0 OPERABLE UNIT NO. 6, SITE 54, CRASH CREW FIRE TRAINING BURN PIT

Information presented in Sections 4.1 and 4.2 was obtained from the ESE Site Summary Report, 1990.

4.1 Site Location and Setting

Site 54 is an approximately 1.5 acre site within MCAS New River (Figure 4-1). It is located adjacent to the southwest end of Runway 5-23 near Building 3614. The burn pit is located in the center of the site. To the northwest of a pit is an aboveground storage tank which is reported to contain No. 2 fuel oil. An oil/water separator, which is used to temporarily store spent fuel, is located southeast of the pit. Further, a drainage ditch is located south of the pit and extends away toward existing well 54GW03.

4.2 Site History

This area is believed to have been used since the mid-1950s for crash crew training. It is still actively used for training. Fuels (principally JP-type and possibly leaded fuels) and waste fuels were used in the training exercises. Originally the training was conducted on the ground surface. Later a burn pit was used, which was lined with asphalt around 1975. An initial site investigation was performed in 1983. Figure 4-2 presents the locations of the sampling points for all media investigated during the IAS.

Soils

During the 1984 investigation, nine soil borings were hand augered in the vicinity of the burn pit area. The results of the soil boring investigation indicated that contamination by waste POL underlies the site to the east and southeast of the burn pit. This was evidenced by a fuel odor detected during augering in these areas. In addition, during periods of high rainfall, quantities of waste POL have been observed to seep from the ground into the drainage ditches. However, no soil samples were sent for analytical analyses.

Groundwater

One shallow monitoring well was installed during the initial site investigation in 1984. Groundwater samples from the shallow well (54GW01) and Supply Well 5009 were collected and analyzed for: cadmium, chromium, lead, O&G, VOCs, and total phenols. The July 1984 results indicated that chromium, O&G, and phenols were detected in well 54GW01, but only phenols were detected in the Supply well 5009. No VOCs were detected in either of the 1984 samples.

Two additional shallow monitoring wells (54GW02 and 54GW03) were installed during the 1986 investigation, one upgradient and one downgradient of 54GW01. Samples were collected from these two new wells and the existing shallow well and analyzed for the following chemicals:

- Cadmium
- Chromium
- Hexavalent Chromium
- Lead
- Oil and grease (O&G)
- Volatile Organics (VOC)
- Total Phenols
- Xylene
- Methyl ethyl ketone
- Methyl isobutyl ketone
- Ethylene dibromide

Table 4-1 presents the analytical results from the 1984, 1986, and 1987 sampling efforts and the results.

The 1986 and 1987 results indicate that the samples collected from upgradient well 54GW02 contained both total chromium and hexavalent chromium. The sample collected in 1987 also detected lead (27 µg/L). At least one of the samples collected from downgradient monitoring well 54GW03 also contained levels of chromium and hexavalent chromium. O&G was documented in each of the samples collected with concentrations ranging from 1000 to 3000 µg/L. The groundwater sample collected from well 54GW01 contained the same compounds as in the 1984 sampling effort, chromium, O&G and phenols. None of the groundwater samples collected during the 1986/87 sampling investigation contained VOCs.

Surface Water/Sediment

Three surface water and sediment locations along the drainage ditch southeast and southwest of the pit were sampled during the 1986 sampling effort (Figure 4-1). The surface water samples were analyzed for the same compounds as the groundwater. Sediment samples were analyzed for cadmium, chromium, hexavalent chromium, lead, O&G, total phenols, and ethylene dibromide.

Total phenols were detected at a concentration of 3 µg/L surface water sample 54SW1 (collected from the ditch along the southeast side of the site).

Analytical results for the three sediment samples were presented in Table 4-2. All three of the samples contained chromium, O&G, and total phenols. The two upstream samples also contained lead. None of the samples contained VOCs.

4.3 Site Observations

The following provides a brief description of Site 54 field observations which were noted during the site visit from March 16 through 18, 1994. Figure 4-2 depicts the locations of the features noted during the site visit.

- Fuel odor very evident while standing north of the burn pit.
- Fuel sheen on the standing water in the burn pit.
- A concrete bermed area was noted northwest of the burn pit. Rusted rings on the concrete seem to indicate that this area may be used for container storage.
- A concrete bermed area was noted east of the burn pit. The bermed area contained some burnt debris. The condition of the concrete berm (curb) is deteriorating.
- A new grass area was identified southwest of the burn pit. This had a rectangular patch of bright green grass. Very noticeable.
- A stressed area - rectangular - was identified adjacent to the new grass area. This may have been used as a burn area.
- The area of the site along Perimeter Road was found to have broken glass, and metal debris scattered into the ground. A small spill area (2 feet by 4 feet) was also identified in this area.

4.4 Proposed Sampling Investigation

The following field investigation activities are proposed at Site 54. Sample locations are identified on Figure 4-3.

Soil Borings/Soil Samples

- Small Oil Spill Area: Four surface sample locations (field test kit analysis)
- Former Burn Area/Burn Pit Area/Concrete Container Storage Area/Fuel Oil UST: Fourteen surface sample locations (field/test kit analysis)

Surface soil samples (approximately from 0 to 18-inches) will be collected at the areas identified above. Each sample will be subject to analysis in the field using the Ensys, Inc. test kit for Petroleum Fuel Sensitivities. Samples will be collected and analyzed until the extent of soil contamination (less the 10 parts per million) is defined. Confirmatory samples (surface and subsurface sample just above the water table) will then be collected within the area of concern and around the perimeter of the extent of contamination. Confirmatory samples will be analyzed for TCL volatiles, semivolatiles, TPH, and TAL metals.

Well Installation/Groundwater Samples

- One shallow monitoring well (54GW04) will be installed southeast of the Burn Pit Area.
- Three temporary monitoring wells will be installed around the Burn Pit Area.

The shallow monitoring well will be installed within the surficial aquifer at an estimated depth of 25 feet below ground surface. Temporary monitoring wells will be installed approximately five feet below the water table. Groundwater samples collected from all existing and newly installed shallow monitoring wells will be analyzed for TCL volatiles, semivolatiles, and total and dissolved TAL metals. Samples collected from the temporary wells will be analyzed for TCL volatiles and semivolatiles.

Drainage Ditch Water/Soil Samples

- Drainage Ditch from Burn Pit Area: Two sample stations on each side of the road.

Water and soil samples collected from the ditch will be analyzed for TCL volatiles, semivolatiles, and total TAL metals.

SECTION 4.0
Tables

TABLE 4-1
GROUNDWATER ANALYTICAL RESULTS
SITE 54 - CRASH CREW FIRE TRAINING BURN PIT
SITE SUMMARY REPORT, 1990
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number	54GW1	54GW1	Supply Well 5009	54GW2	54GW2	54GW3	54GW3	Standard	
Sample Date	7/16/84	12/11/86	7/16/84	12/10/86	3/5/87	12/10/86	3/5/87	NCWQS (1)	MCL (2)
Parameter: Units (ug/L)									
Chromium	60	10.7	< 8	67.9	28	23.9	32	50	100
Chromium (+6)	NA	< 10	NA	14.6	45.9	< 10	12.1	--	--
Lead	< 40	< 27	< 40	< 27	27	< 27	< 27	15 (3)	15 (3)
Oil & Grease	1000	3000	<900	< 300	1000	2000	2000	--	--
Phenols	3	4	2	< 2	< 2	6	< 2	--	--

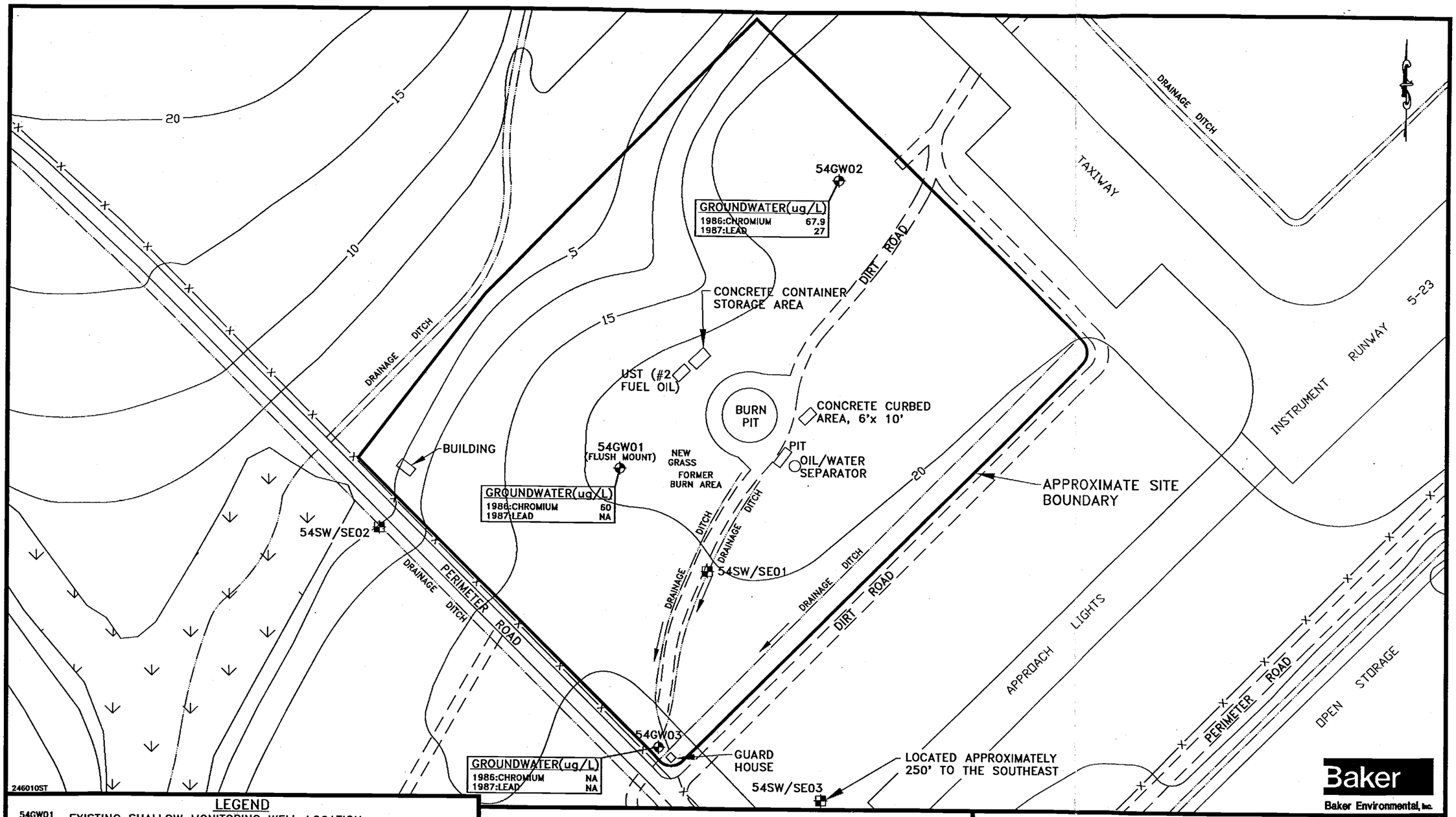
Notes:
ug/L - microgram per liter
NA - Not analyzed.
(--) - Standard not available.
Shading indicates that chemical exceeded standard.
(1) NCWQS - North Carolina Water Quality Standards for groundwater
(2) MCL - Maximum Contaminant Level
(3) At the time of the investigation the NCWQS and MCL for lead in groundwater were 50 ug/L.
the analytical methods chosen for analysis of the samples were greater than the current NCWQS and MCL for lead (15 ug/L).
Source: ESE, Site Summary Report, Final. September, 1990.

TABLE 4-2
SEDIMENT ANALYTICAL RESULTS
SITE 54 - CRASH CREW FIRE TRAINING BURN PIT
SITE SUMMARY REPORT, 1990
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number: Date Sampled:	54SE1 12/10/86	54SE2 12/10/86	54SE3 12/10/86
Parameter: Units (mg/kg)			
Chromium	19.3	6.45	6.48
Lead	28.2	9.36	<6.73
Oil & Grease	998	884	1560
Phenols	0.443	0.334	2.01

NOTES:
mg/kg - Milligram per kilogram
Source: ESE, Site Summary Report, Final. September, 1990.

SECTION 4.0
Figures



LEGEND

54GW01 — EXISTING SHALLOW MONITORING WELL LOCATION

54SW/SE01 — PREVIOUS SURFACE WATER/SEDIMENT SAMPLE STATION

NA — NOT APPLICABLE

NOTES:
- –ALL RESULTS PRESENTED IN ug/L.
- –ONLY THOSE CONCENTRATIONS WHICH EXCEED STATE/FEDERAL STANDARDS, OR RISK–BASED/BASE BACKGROUND ARE SHOWN.
- –NO SURFACE WATER/SEDIMENT CONCENTRATIONS EXCEEDED STANDARDS OR CRITERIA.

SOURCE: LANTDIV, FEB. 1992

150 0 75 150 300

1 inch = 150 ft.

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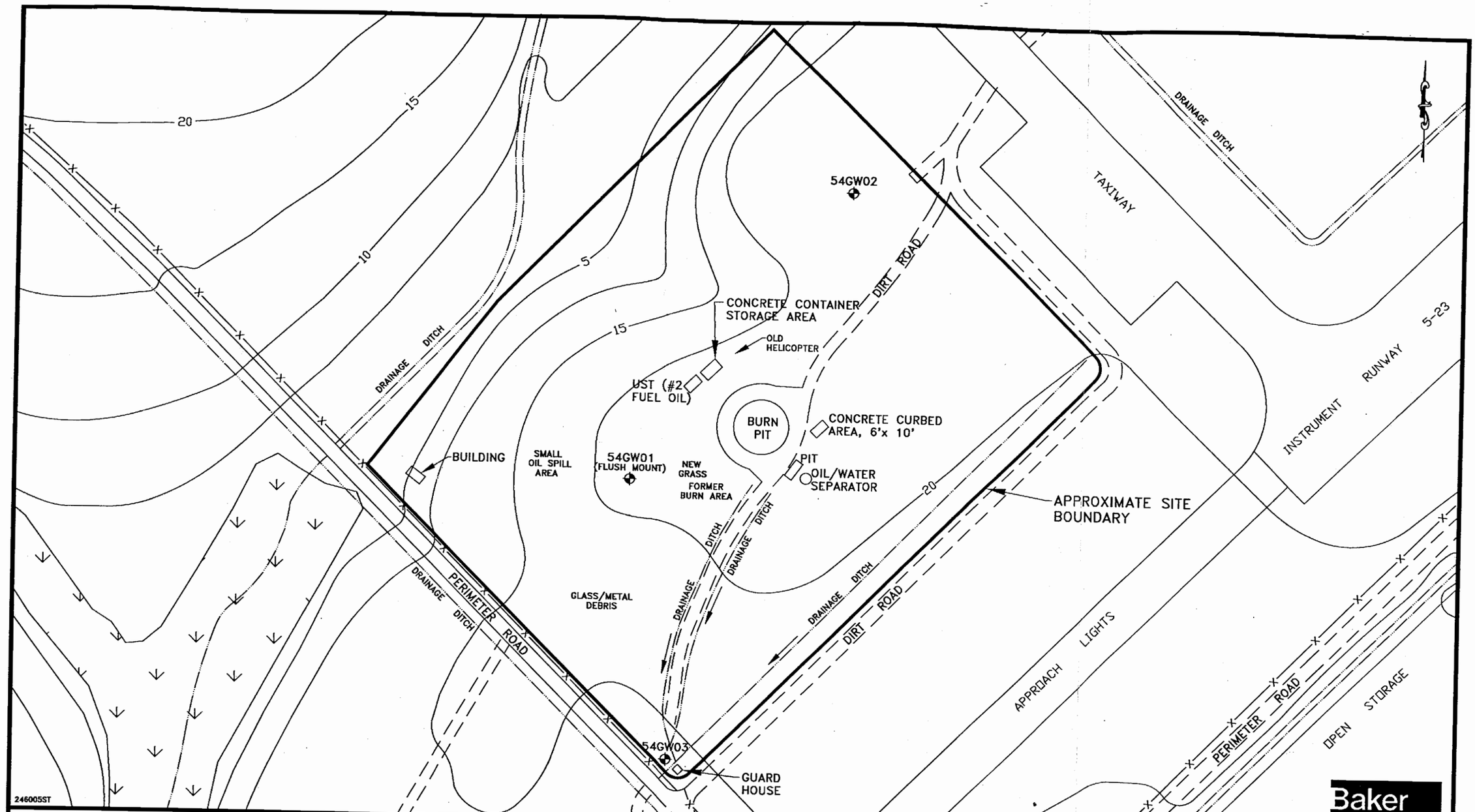
FIGURE 4–1
PREVIOUS INVESTIGATION SAMPLE LOCATIONS AND RESULTS
SITE 54: CRASH CREW FIRE TRAINING BURN PIT
CTO–0246

MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA

00397M117



LEGEND

54GW01 EXISTING SHALLOW MONITORING WELL LOCATION

150 0 75 150 300

1 inch = 150 ft.

SOURCE: LANTDIV, FEB. 1992

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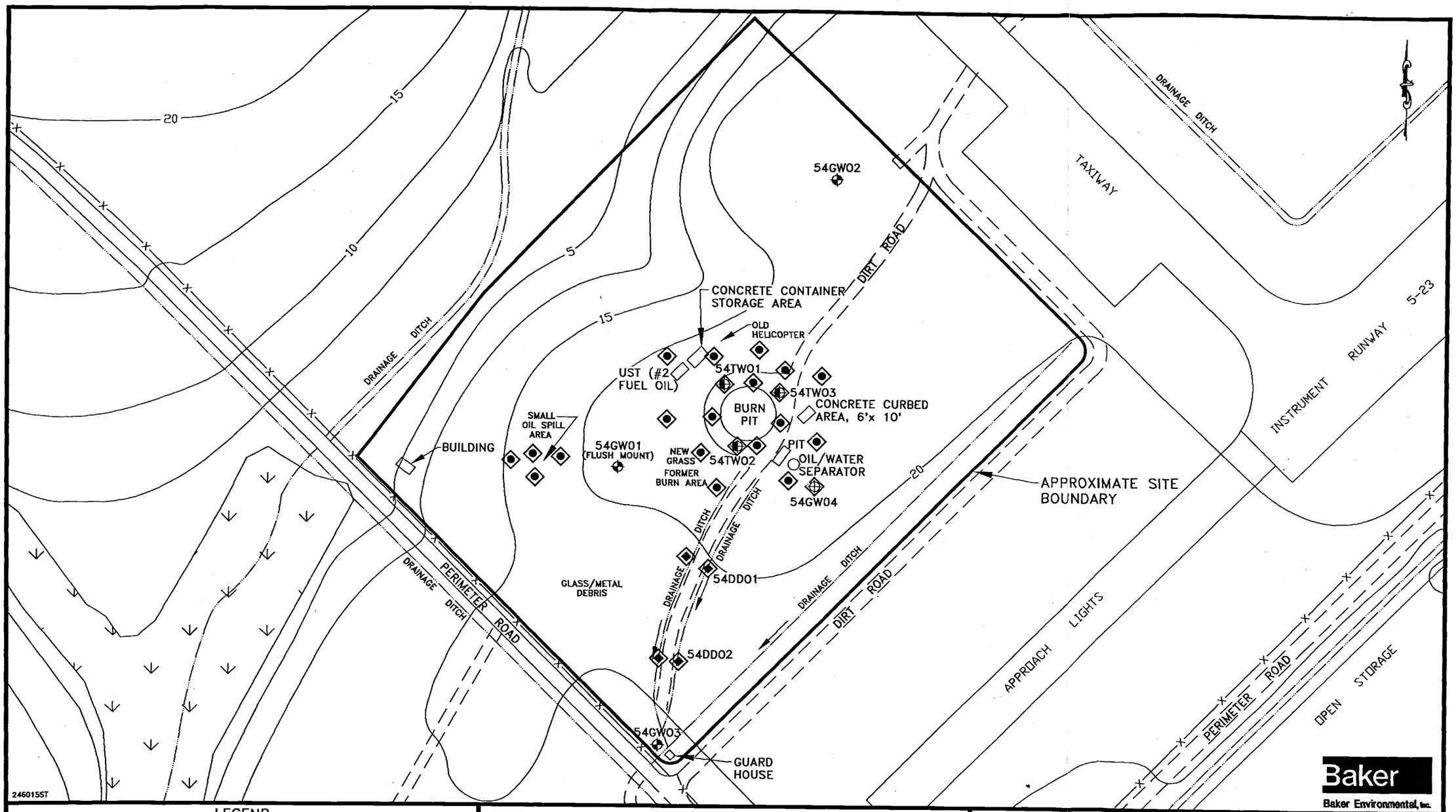
FIGURE 4-2
OBSERVATIONS
SITE 54: CRASH CREW FIRE
TRAINING BURN PIT
CTO-0246
MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA

0039M173



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LEGEND

- 54GW01 — EXISTING SHALLOW MONITORING WELL LOCATION
- 54GW04 — PROPOSED SHALLOW MONITORING WELL LOCATION
- 54TW01 — PROPOSED TEMPORARY MONITORING WELL LOCATION
- PROPOSED SURFACE SOIL SAMPLE LOCATION (TEST KIT ANALYSIS)
- 54DD01 — PROPOSED DRAINAGE DITCH SAMPLE LOCATION (SOIL AND/OR WATER)

SOURCE: LANTDIV, FEB. 1992

150 0 75 150 300

1 inch = 150 ft.

FIGURE 4-3
PROPOSED SAMPLE LOCATIONS
SITE 54: CRASH CREW FIRE TRAINING BURN PIT
CTO-0246
MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA

00397M127

5.0 OPERABLE UNIT NO. 6, SITE 86, TANKS AS419, AS420, AND AS421

Information presented in Sections 5.1 and 5.2 was obtained from the Dewberry and Davis, Tank Closure Report, 1988, and O'Brien and Gere, Site Assessment Report, 1992.

5.1 Site Location and Setting

Site 86 is located at MCAS, New River, North Carolina (see Figure 5-1). The site is located on the southwest corner of Foster Street and Campbell Street. Two hundred feet to the south is the MCAS fire station (Building AS502). Approximately 800 feet beyond the fire station, to the south, lies the Air Station's taxiway. To the west lie large machinery buildings, aircraft hangers and the Base commissary building. Across Foster Street, to the east, is an area under construction with plans to build a new aircraft hanger. Farther to the east (approximately 4,000 feet), the nearest surface water body is the New River. To the north of the site are office type buildings.

5.2 Site History

Three 25,000 gallon aboveground storage tanks (ASTs) (AS419, AS420, and AS421) were installed in 1954 for storage of #6 fuel oil and used for such until 1979. From 1979 until 1988 the tanks were reportedly used for waste oil storage. The tanks were emptied in 1988, and are believed to have been removed in 1992.

5.2.1 Summary of Previous Site Investigations

Preliminary site investigations were conducted in November 1990 by Dewberry and Davis. This investigation included soil borings in the area of the tanks. Eleven soil samples were analyzed for total petroleum hydrocarbons (TPH). Results from two soil samples are as follows:

- Sample NRSB-5, near the valves on the west sides of the tanks, 1-2 feet below grade. 211 ppm diesel, 7000 ppm total TPH.

- Sample NRSB-7, near the valves on the east sides of the tanks, 0.5-2 feet below grade. 70 ppm diesel, 4 feet was 200 ppm total TPH.

Results of the other nine soil boring samples were below the detection limit of 10 ppm. Soil samples analyzed for VOCs (34 priority pollutants; EPA Method 8010/8020) yielded 0.006 ppm chloroform, 0.03 ppm methylene chloride, 0.035 ppm 1,1,1-trichloroethane, and 0.061 ppm 1,1,2-trichlorotrifluoroethane. Dewberry & Davis concluded that, based on the locations and concentrations of the detected compounds, the results are likely related to localized surface spills.

The tanks were surrounded by an earthen berm. Ground cover at Site 86 is grassy. The surrounding area cover consists of buildings and pavement. The tanks were connected by piping and a hose to a small building which likely served as a pump house. A storm water drainage ditch runs around the outside of the site. Steam lines are located overhead around the perimeter of the site.

The 1992 site investigation involved the installation, development and sampling of,

- Seven shallow monitoring wells and seven deep monitoring wells (as nested pairs; GW01-GW14). Shallow wells were identified with odd numbers (e.g., GW01) and deep wells were identified with even numbers (e.g., GW02).

- Four soil borings (B1-B4)
- Ten hydropunches (H1-H10)

Soil

Two soil samples from each of the four soil borings (located "over" the former AST area) and two soil samples from each of the seven deep monitoring wells were selected for laboratory analyses of TPH. Deep soil samples were collected at the water table (14'-16' depth), and shallow samples were collected five feet above the water table (9'-11' depth). Five deep soil samples (MW1, MW4, MW6, MW8, and MW12) were analyzed for flashpoint and pH. Two deep soil samples (MW2 and MW6) were selected for full-scan toxicity characteristic leaching procedure (TCLP) analyses.

The pH results ranged form 4.8 to 7.6; flashpoint tests were negative; the TCLP results were below EPA regulatory criteria for this procedure.

Soil TPH results were below the North Carolina action level of 10 mg/kg for 21 of the 22 samples. The TPH concentration from boring B2, at a depth of 4-6 feet, was 125 mg/kg.

Positively detected concentrations ranged from 1.13 to 4.06 mg/kg. One sample (B2, 4'-6') yielded results exceeding the North Carolina criterion of 10 mg/kg. Results of the sample from B2 at 8-10 feet were below the detection limit.

Groundwater

Eight organic compounds were detected in groundwater sample:

benzene	trichloroethylene
toluene	perchloroethylene
1,1-dichloroethane	chloroethane
1,2-dichloroethylene	1,1,1-trichloroethane

Of these, benzene, trichloroethylene and perchloroethylene were detected above their corresponding NCWQS in one or more samples. Toluene and 1,1,1-trichloroethane were detected below the NCWQS. 1,1-Dichloroethane, 1,2-dichloroethylene and chloroethane do not have groundwater standards established by North Carolina.

No free product was detected in the fourteen groundwater monitoring wells, nor was free product detected in the ten hydropunches.

Groundwater samples from each monitoring well and hydropunch were analyzed for VOCs. The groundwater sample from 86GW05 was analyzed for TCLP compounds.

TCLP results from the 86GW05 groundwater sample were less than detection limits for metals, volatiles, pesticides and herbicides.

5.3 Site Observations

The following provides a brief description of Site 86 field observations which were noted during the site visit from March 16 through 18, 1994. Figure 5-2 depicts the locations of the features noted during the site visit.

- The location of the former ASTs are not easily identifiable due to re-vegetation.
- A fenced-in transformer area is located at the northeast corner of the site.
- Overhead steam pipelines perimeter 3 sides of the site.
- Only one area of stressed vegetation was noted. This was a small rectangular area east of the former tank locations.

5.4 Proposed Sampling Investigation

The following field investigation activities are proposed at Site 86. Sample locations are identified on Figure 5-3.

Soil Borings/Soil Samples

- Around Former Aboveground Storage Tank Area: Nine surface and subsurface sample locations
- Sample Collection From Well Installation: Surface and subsurface samples at selected wells)

Four soil samples will be analyzed for TCL volatiles, semivolatiles, and TPH on an accelerated laboratory turnaround time. Samples collected from these locations will also be analyzed for TAL metals (routine laboratory turnaround time). All other samples will be analyzed for TCL volatiles, semivolatiles, and TAL metals on a routine laboratory turnaround time. Note that surface samples will be collected from just below ground surface to 12 inches and subsurface samples will be collected just above the water table. A third sample from each boring may also be submitted for analysis if evidence of contamination (i.e., visual or by monitoring instrument) is noted.

Well Installation/Groundwater Samples

- One intermediate/deep monitoring well cluster (86GW15IW and 86GW15DW) will be installed downgradient from existing wells 86GW09 and 86GW10.
- One shallow/deep monitoring well cluster (86GW16 and 86GW16DW) will be installed downgradient from existing wells 86GW11 and 86GW12.
- One intermediate/deep monitoring well cluster (86GW17IW and 86GW17DW) southwest of existing wells 86GW03 and 86GW04.
- One deep monitoring well (86GW18DW) adjacent to existing wells 86GW03 and 86GW04.
- One deep monitoring well (86GW19DW) will be installed adjacent to existing wells 86GW09 and 86GW10.

The shallow monitoring wells will be installed within the surficial aquifer at an estimated depth of 15 feet below ground surface. Intermediate monitoring wells will be installed within the lower portion of the surficial aquifer at approximately 30 feet below ground surface. Deep monitoring wells (Type III or double-cased wells) will be installed below the semi-confining layer which separates the surficial aquifer

and deeper Castle Hayne aquifer. Based on published information obtained from a USGS report for MCB Camp Lejeune, the semi-confining layer is present at a depth between 40 and 60 feet.

Groundwater samples collected from all existing and newly installed monitoring wells will be analyzed for TCL volatiles, semivolatiles, and pesticides, and total and dissolved TAL metals.

SECTION 5.0
Tables

TABLE 5-1
GROUNDWATER ANALYTICAL RESULTS
SITE 86 - TANKS AS419, AS420, AND AS421
SITE SUMMARY REPORT, 1990
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Number	Standards		MW2	MW3 *	MW4	MW6	MW8	MW10	MW12	H9 **
	NCWQSs (1)	MCLs (2)								
Parameter: Units (ug/L)										
Benzene	1	5	ND	ND	6	1	ND	ND	ND	ND
Toluene	1000	1000	350	ND	ND	ND	2	ND	1	ND
1,1-Dichloroethane	700	5	ND	ND	ND	ND	ND	750	ND	ND
1,2-Dichloroethylene	--	70 ***	ND	ND	94	ND	ND	76	ND	ND
Trichloroethylene	2.8	5	ND	ND	280	4	ND	77	1	ND
Perchloroethylene	0.7	5	ND	4	ND	ND	ND	210	4	ND
Chloroethane	--	--	ND	ND	ND	ND	ND	12	ND	ND
1,1,1-Tetrachloroethane	200	200	ND	ND	ND	ND	ND	ND	ND	2

Notes:
ug/L - microgram per liter
* - Shallow well, all other wells with positive detections were deep wells.
** - H - Hydropunch
*** - Value is for cis-1,2-dichloroethylene
ND - Not detected
(--) - Standard or criteria not available
(1) NCWQS - North Carolina Water Quality Standards for groundwater
(2) MCL - Maximum Contaminant Level
MCL is for cis-1,2-dichloroethene
Source: ESE, Site Summary Report, Final. September, 1990.

SECTION 5.0
Figures

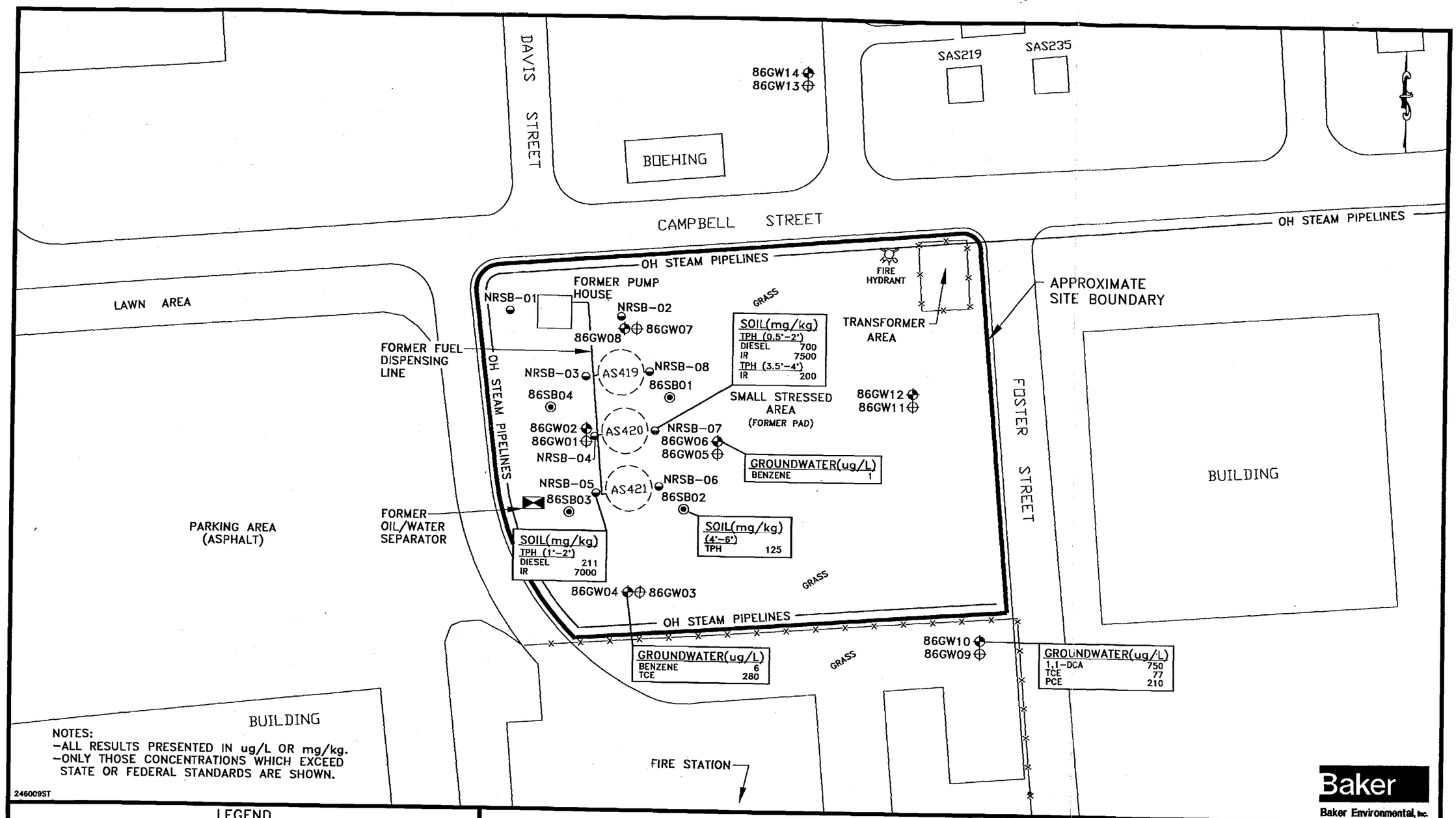
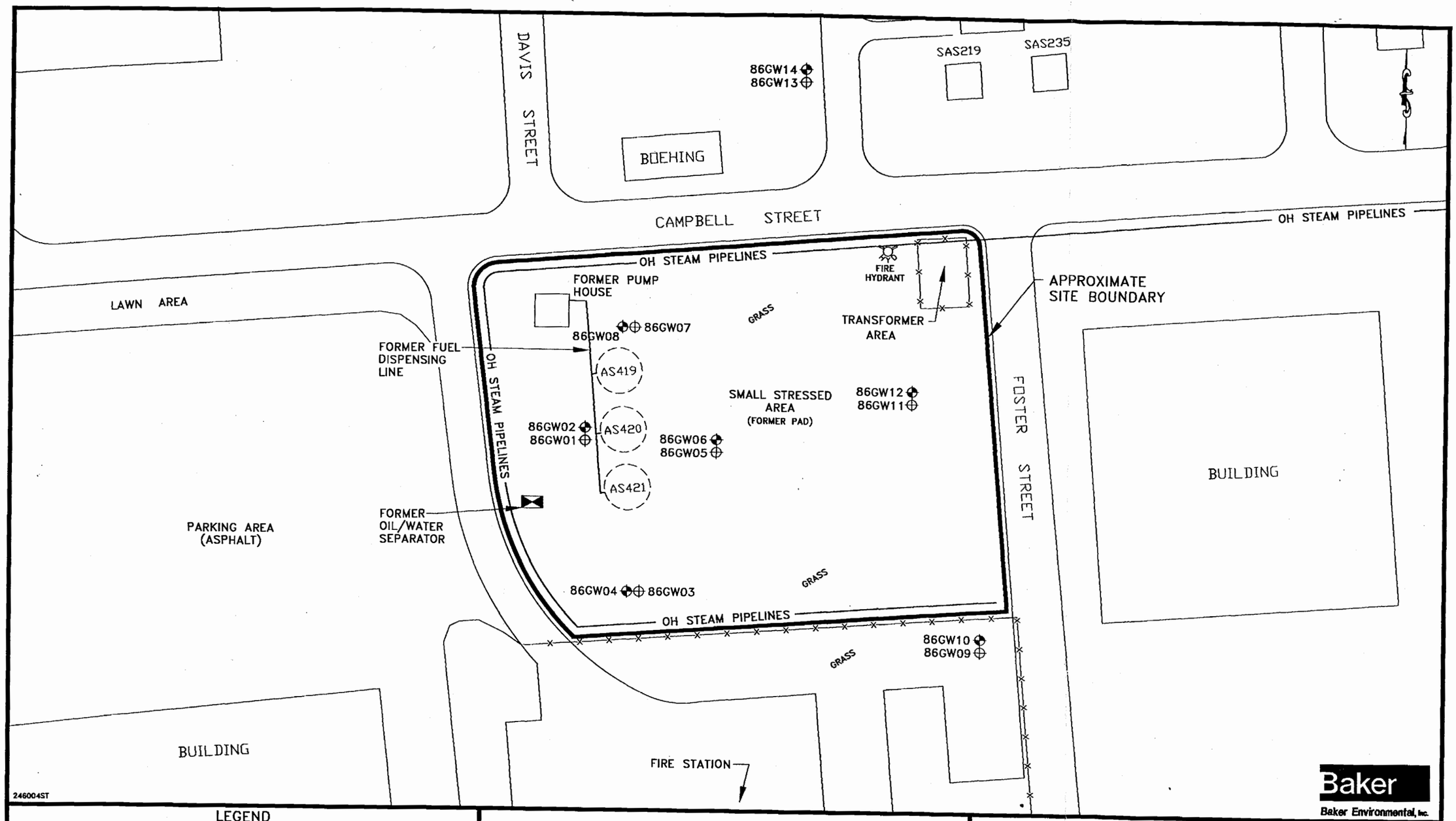


FIGURE 5-1
PREVIOUS INVESTIGATION SAMPLE STATIONS AND RESULTS
SITE 86: TANK AREA AS419 - AS521 AT MARINE CORPS AIR STATION
CTO-0246
MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA

00397 M142



LEGEND

86GW01 EXISTING SHALLOW MONITORING WELL LOCATION

86GW02 EXISTING INTERMEDIATE MONITORING WELL LOCATION

(AS421) FORMER AST LOCATION

SOURCE: LANTDIV, FEB. 1992

50 0 25 50 100

1 inch = 50 ft.

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FIGURE 5-2
OBSERVATIONS
SITE 86: TANK AREA AS419 -
AS521 AT MARINE CORPS AIR STATION
CTO-0246
MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA

00397M157

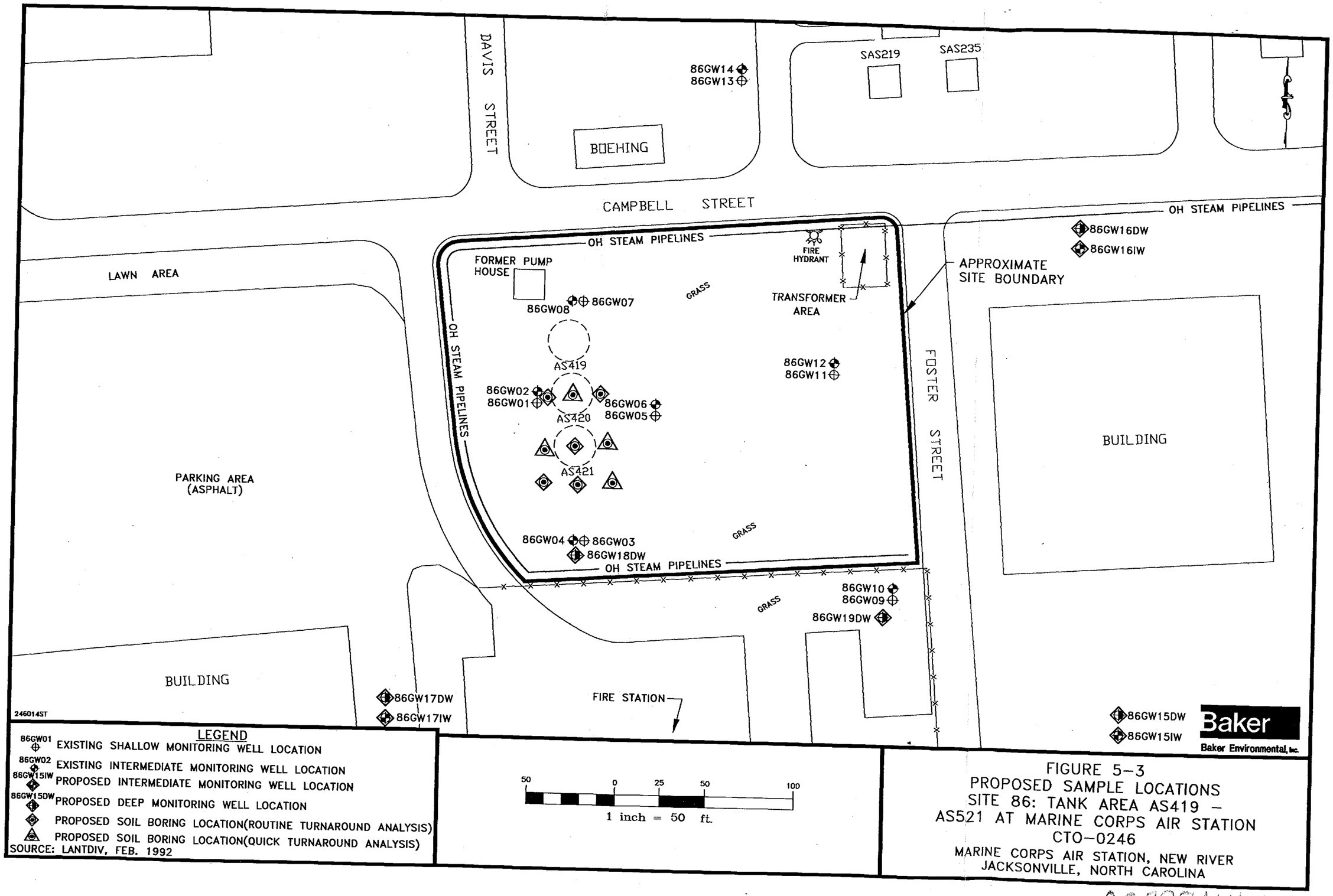

FIGURE 5-3
PROPOSED SAMPLE LOCATIONS
SITE 86: TANK AREA AS419 -
AS521 AT MARINE CORPS AIR STATION
CTO-0246
MARINE CORPS AIR STATION, NEW RIVER
JACKSONVILLE, NORTH CAROLINA

00397M67